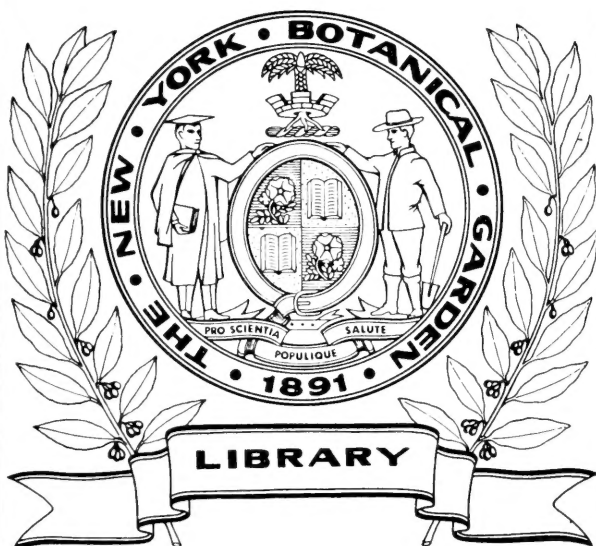
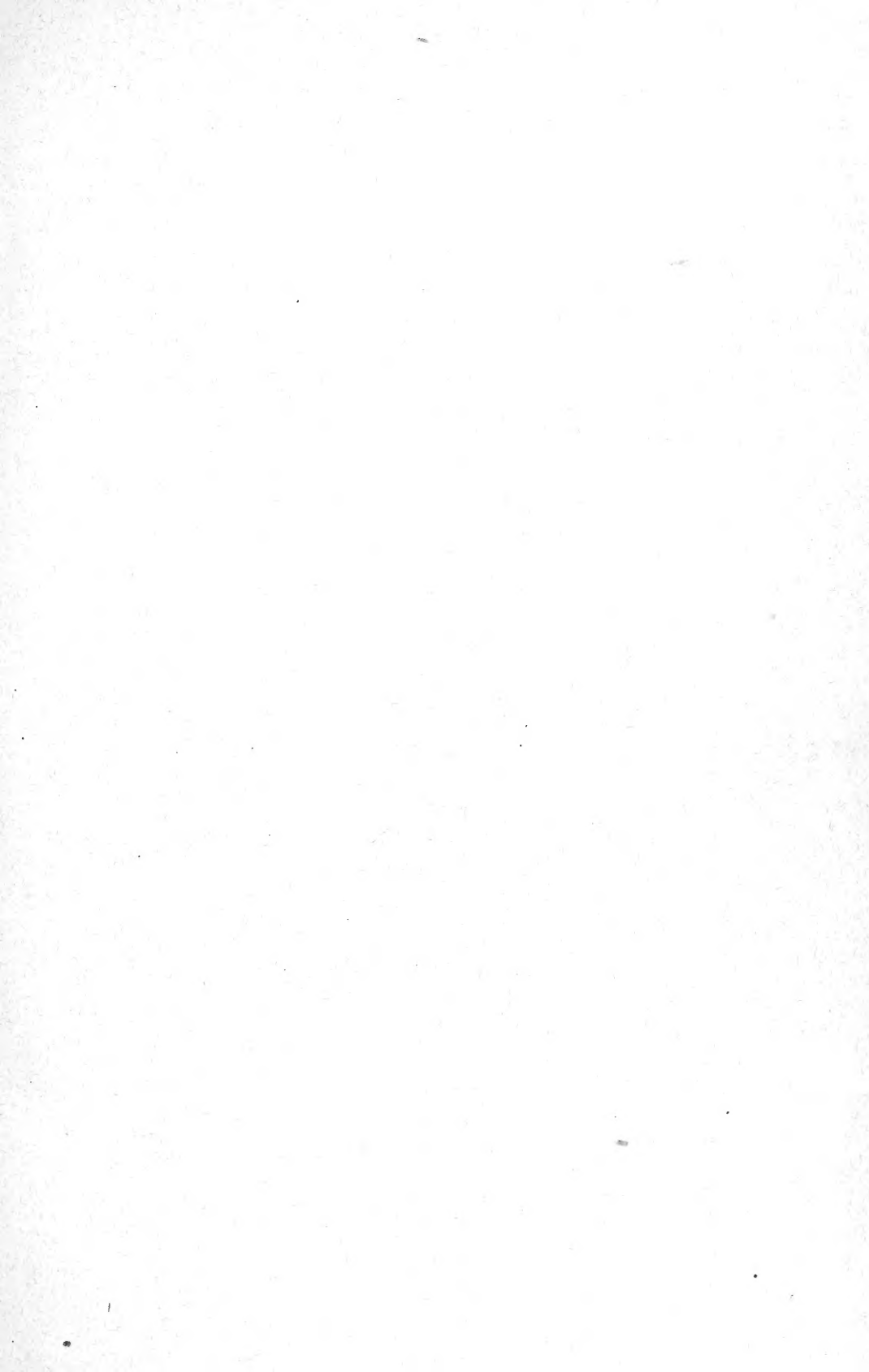
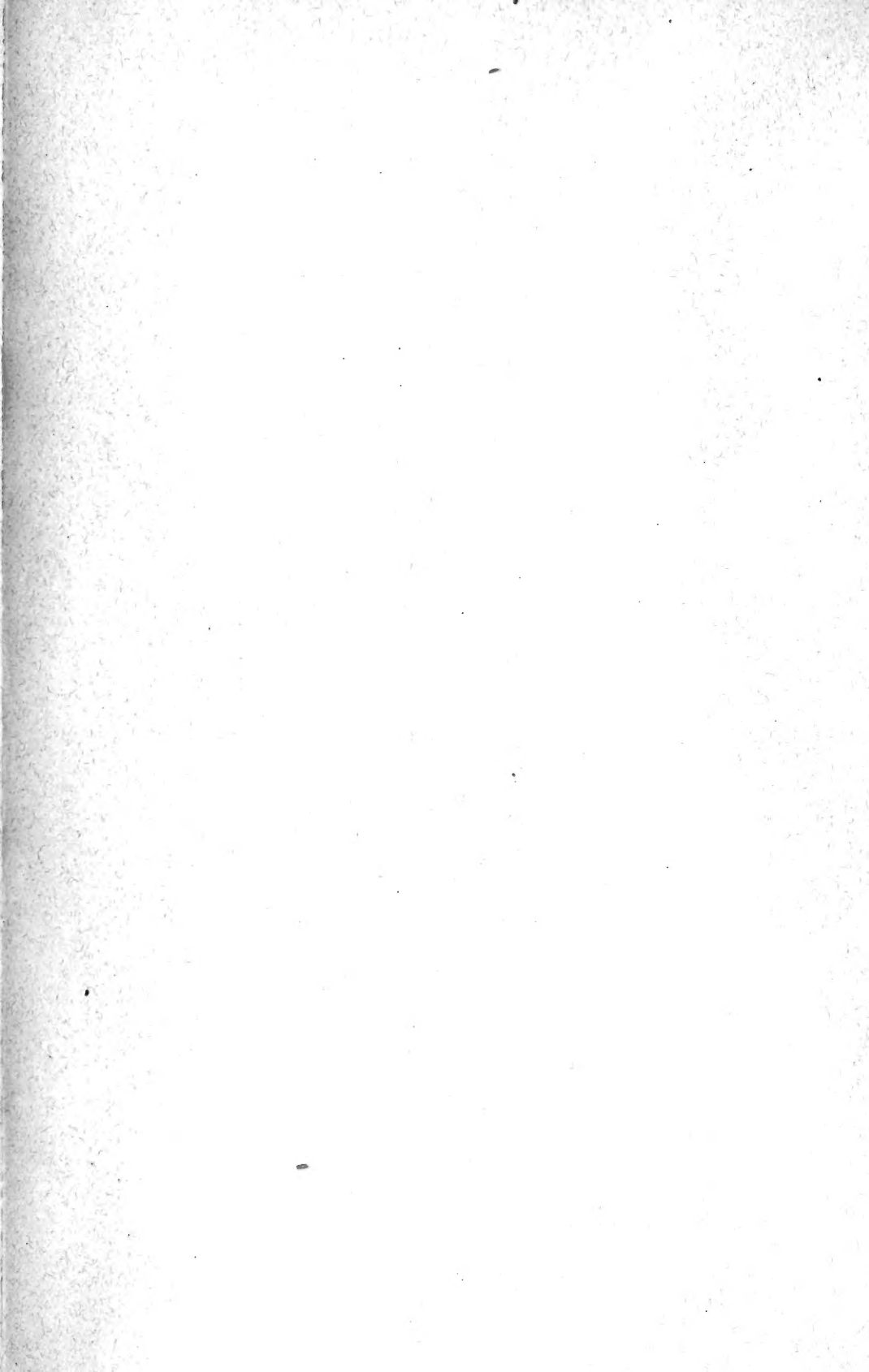


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CONTENTS OF VOLUME XX

INDEX OF AUTHORS

	Page		Page
Adams, Bristow, article by, 617; poem by.	786	"J. D. G.," poem by.....	707
Allen, E. T., address by, 58;		Johnson, Charles, article by.....	414
articles.....	496-745-870	Jones, Chapin, article by.....	674
Barrus, George Latta, article by.....	287	Kiefer, Francis, article by.....	71
Barton, J. E., article by.....	135	Kneipp, L. F., article by.....	697
Benedict, M. A., article by.....	281	Knowlton, F. H., article by.....	709
Bigelow, Edward F., article by.....	669-708	Lange, Prof. D., article by.....	376
Blanchard, C. J., article by.....	393	Laut, Agnes C., article by.....	839
Bradley, Harold C., article by.....	406	Linthicum, J. Charles, article by.....	543
Boardman, Mabel T., article by.....	52	Long, George S., article by.....	632
Boerker, R. H., article by.....	22	Matthes, F. E., article by.....	646
Brown, H. J., article by.....	69	Maxwell, Hu, article by.....	577
Brown, Nelson C., article by.....	201	Maxwell, R. Brooke, article by.....	805
Browne, J. H., article by.....	795	Miller, Warren H., articles by	
Bryant, R. C., article by.....	81-239-881		1-101-165-261-356-448-501
Buhler, Ernest O., article by.....	343	Mills, Knower, article by.....	679
Childs, Neal T., article by.....	788	Moon, F. F., article by.....	31-298
Collingwood, G. H., article by.....	627	Morrill, W. J., article by.....	641
Collins, J. Franklin, article by.....	719	Olmsted, Frederick E., article by.....	887
Cutler, H. G., article by.....	627	Pearl, Maud DeWitt, article by.....	528
Dana, Samuel T., article by.....	769-858	Potter, Albert F., article by.....	110
Dithridge, Rachel L., poem by.....	527	Preston, E. V., article by.....	572
Dodge, Alexander W.....	815-893	Price, Overton Westfeldt, article by....	273-420
Dollar, Robert, article by.....	499	Redington, Paul G., article by.....	182-268-511
Drinker, Dr. H. S., address by.....	207	Riley, Smith, article by.....	594
Duthie, George A., article by.....	14	Robbins, W. W., article by.....	403
Fisher, W. R., article by.....	153-370	Roorbach, Eloise, article by.....	92
Gaskill, Alfred, article by.....	906	Rosenbluth, R., article by.....	118-185
Gillis, Donald, article by.....	37	Schock, Oliver D., article by.....	416
Graves, Henry S., address by.....	377	Simmons, J. R., poem by.....	576
Guyton, Jack, article by.....	345	Smith, P. S., poem by.....	308
Hanssen, Arnold, article by.....	811	Sterling, E. A., article by.....	319
Haynes, Winthrop P., article by.....	346	Strobeck, John L., article by.....	142
Hodge, William C., article by.....	568	Venemann, T. W., article by.....	735
Hoover, M. H., article by.....	820	Wharton, William P., article by.....	211
Hopkins, Gertrude Cornwall, poem by...	267	Wilson, Ellwood, Editor of Canadian	
Houston, David F., article by.....	867	Department.....	529-605-684-757-825
Jackson, A. G., poem by.....	156	Woolsey, Jr., Theodore S., article by.....	44

GENERAL INDEX

	<i>Page</i>		<i>Page</i>
Acknowledgment, An.....	510	Boys Make Bird Houses.....	753
Administration, The National Forest—		British Columbia, Progress in—Overton	
David F. Houston.....	867	Westfeldt Price.....	273
Agriculture, Forest Conservation and—		Business Management of Woodlots—R.	
Theodore S. Woolsey, Jr.....	44	Rosenbluth.....	185
Alaska, Unlocking.....	469	Buying Handles by Weight.....	880
Alaskans, Conserving Native.....	751	Cableway, Handling Lumber by.....	673
America, The Switzerlands in—Agnes C.		California, Fire Conditions in—Alexander	
Laut.....	839	W. Dodge.....	893
American Forestry Association:		California, Fire Protection in—Knewer	
Annual Meeting, Announcement of	13	Mills.....	679
Annual Meeting, Report of.....	146	California, The Redwood of—J. H.	
Exhibits.....	173-309	Browne.....	795
Announcement of Bond Issue.....	515	Camp Fire-Place, A Safe.....	732
Annual Meeting for 1915, An-		Camps, Conservation of Life in the Lum-	
nouncement of.....	869	ber—Mabel T. Boardman.....	52
Annual Consumption of Wood.....	897	Canadian Department, The—Edited by	
Annual Meeting of the American Forestry		Ellwood Wilson (Department of	
Association, Report of.....	146	Magazine).....	529-605-684-757-825-894
Annual Meeting of the New York State		Canal and the Lumber Trade, The Pan-	
Forestry Association.....	155	ama—R. C. Bryant.....	81
Annual Report on Yosemite National Park	156	Canal, Lumber Trade and the—Robert	
Appalachian National Park, For an—		Dollar.....	499
Donald Gillis.....	37	Cases, Missouri Ouster.....	602
Arborist-Forester—Alfred Gaskill.....	906	Catalpa Growth, A.....	756
Arrest Fire Law Violators.....	571	Chance for the Game, A—Smith Riley...	594
Association's Exhibit, The.....	341	Chautauqua, Forestry at.....	430-591
Back Numbers Wanted.....	677	Chestnut Blight Continues—Oliver D.	
Balsam Fir for Pulp.....	509	Schock.....	416
Baltimore's Shade Trees—R. Brooke		Chestnut, Using Blighted.....	604
Maxwell.....	805	Children Wage War.....	415
Bavarian Forester, The—G. H. Colling-		City Trees, New York's.....	560
wood.....	626	City's Tree Work, A.....	489
Bequest of \$5,000.00.....	606	Coast Conditions, Pacific.....	500
Berks County Conservation Association..	740	Combine Against Fires.....	567
Best Seed Year for Longleaf Pine.....	307	Concession, Philippine Forest.....	524
Better Forest Fire Law—W. R. Fisher...	370	Conditions in California, Fire—Alexander	
Birch, Many Uses for.....	66	W. Dodge.....	893
Bird House, Boys Make.....	753	Conditions, Pacific Coast.....	500
Bird Sanctuaries, State Forests as—		Conference at Vancouver, Forestry.....	64
William P. Wharton.....	211	Conference on Irrigation.....	278
Black Forest, Some Observations on the—		Conference, White Mountain.....	525
F. F. Moon.....	31	Coniferous Nursery Stock, The Blights of	65
Blight Continues, Chestnut—Oliver D.		Conservation and Agriculture, Forest—	
Schock.....	416	Theodore S. Woolsey, Jr.....	44
Blighted Chestnut, Using.....	604	Conservation Association, Berks County..	740
Blights of Coniferous Nursery Stock, The	65	Conservation for Lumbermen.....	418
Bond Issue of the American Forestry Asso-		Conservation of Life in the Lumber Camps	
ciation for \$50,000.00:		—Mabel T. Boardman.....	52
Announcement of.....	515	Conserving Native Alaskans.....	751
Book Reviews (See Reviews, Book)		Consumer, Forests, Lumber and—E. T.	
Boy Scouts Trail Building.....	446	Allen.....	745

	<i>Page</i>		<i>Page</i>
Consumption of Wood, Annual.....	897	Exposition, The Forest Products.....	375
Conventions—See Forestry Conference at Vancouver; Annual Meeting, A. F. A.; Annual Meeting of the New York State Forestry Association; Maryland Conservation Association; Forestry at Chautauqua; Berks County Conservation Association.		Famine, Russia's Forest.....	443
Cornell's Forestry Building.....	432	Federal Power Supreme on Federal Land. 12	
Coulee, The Grand—Winthrop P. Haynes	346	Fence, A Stumper of a—Edward F. Bigelow.....	708
Country Estate, Forestry on the—Warren H. Miller....1-101-165-261-356-448-501		Fence Off Woodlots.....	814
Cruising in Cuba—E. V. Preston.....	572	Fences for Stock, Drift.....	433
Cuba, Cruising in—E. V. Preston.....	572	Filipino Foresters.....	743
Current Literature (Department of the Magazine) . . 76, 160, 234, 314, 388, 464, 539, 612, 693, 765, 834, 907		Filling, Tree.....	718
Daggett, Hallie M. (See "A Woman as a Forest Fire Lookout")		Fir for Pulp, Balsam.....	509
Danger Serious, Fire.....	667	Fire Conditions in California—Alexander W. Dodge.....	893
Dead, George W. Vanderbilt.....	303	Fire Danger Serious.....	667
Destroy Diseased Pines.....	498	Fire Fool, The (Poem)—A. G. Jackson... 156	
Directory, A Forester's.....	828	Fire Law, Better Forest—W. R. Fisher... 370	
Diseased Pines, Destroy.....	498	Fire Law Violators, Arrest.....	571
Drift Fences for Stock.....	433	Fire Line, A New Type of—M. A. Benedict 281	
Early Logger in the Sierras, The— Alexander W. Dodge.....	815	Fire Lookout, A Woman as a Forest... 174	
Economics, Public Knowledge of Forest— E. T. Allen.....	58	Fire Lookout on Mount Lassen, The— William C. Hodge.....	568
Editorial (Department of Magazine) 382, 457, 531, 607, 759, 686, 829, 898		Fire Loss, Small.....	706
Effective Forestry Exhibit, An.....	802	Fire-Place, A Safe Camp.....	732
Elk from Yellowstone Park.....	72	Fire Protection, Example of—Jack Guyton 345	
Epitome of National Reclamation, An— C. J. Blanchard.....	393	Fire Protection in California—Knower Mills.....	679
Essay on Forestry, Prize for an.....	149	Fire Protection on the Ozark National Forest—Francis Kiefer.....	71
Estate, Forestry on the Country—Warren H. Miller.....	1	Fire Protection, West Virginia.....	731
Estimating in the Pacific Northwest, Timber—H. J. Brown.....	69	Fire Protective Work.....	677
European War and the Lumber Trade, The —R. C. Bryant.....	881	Fire Season Closed.....	230
Example of Fire Protection—Jack Guyton 345		Fires (Poem) by Bristow Adams.....	786
Exhibit, American Forestry Association.. 309		Fires Caused by Lightning.....	437
Exhibit, An Effective Forestry.....	802	Fires, Combine Against.....	567
Exhibit at the Forest Products Exposition, An.....	141	Fires Controlled, Forest.....	226
Exhibit of Forest Products.....	431	Fires, Numerous Forest.....	516
Exhibit, The Association's.....	341	Fires, Warnings Against.....	371
Exhibits, American Forestry Association.. 173		Fires, Winter Forest.....	308
Exposition, An Exhibit at the Forest Products.....	141	Fish for the Forests—L. F. Kneipp.....	697
Exposition, Forestry at the.....	828	Fish Increase, Game and—Prof. D. Lange 376	
		Fish, Our Vanishing Food—J. Charles Linthicum.....	543
		Five Thousand Dollar Bequest.....	606
		Florida Monster, A.....	683
		Food Fish, Our Vanishing—J. Charles Linthicum.....	543
		Fool, The Fire (Poem)—A. G. Jackson... 156	
		For An Appalachian National Park— Donald Gillis.....	37
		Foreman, An Honest (Poem)—Transcribed by E. M. Price.....	688
		Forest Administration, The National— David F. Houston.....	867
		Forest as Game Preserve, State—Ernest O. Buhler.....	343

	<i>Page</i>		<i>Page</i>
Forest Conservation and Agriculture—		Forestry at the Exposition.....	828
Theodore S. Woolsey, Jr.....	44	Forestry Building, Cornell's.....	432
Forest Economics, Public Knowledge of—		Forestry Building, Dedication of a.....	279
E. T. Allen.....	58	Forestry Committee Reports, Announce-	
Forest Famine, Russia's.....	443	ment of.....	145
Forest Fire Law, Better—W. R. Fisher..	370	Forestry Conference at Vancouver.....	64
Forest Fires Controlled.....	226	Forestry Exhibit, An Effective.....	802
Forest Fires, Numerous.....	516	Forestry, George W. Vanderbilt, Pioneer	
Forest Insect Problem, National Organ-		in—Overton Westfeldt Price.....	420
ization to Study.....	68	Forestry, Governor Glynn for.....	151
Forest Land, Save This.....	342	Forestry Law, A South Carolina.....	152
Forest Notes: (Department of Magazine)		Forestry Law for Virginia.....	151, 305
73, 157, 222, 309, 384, 460, 534, 609,		Forestry, Loblolly Pine Adapted to.....	231
689, 762, 831, 901		Forestry on the Country Estate—Warren	
Forest of Stone, A—F. H. Knowlton....	709	H. Miller:	
Forest Operations: Forestry on the		I. The Woodlot.....	1
Country Estate, III, Warren H.		II. The Stony Pasture.....	101
Miller.....	165	III. Forest Operations.....	165
Forest Planting on Pike's Peak—George		IV. Tree Troubles.....	261
A. Duthie.....	14	V. The Private Nursery for Rais-	
Forest Products Exposition, An Exhibit		ing Standard Tree Seedlings	
at the.....	141	and How to Prepare and	
Forest Products Exposition, The.....	375	Manage it.....	356
Forest Products Exhibit.....	431	VI. Getting Acquainted.....	448
Forest Purchased, Pisgah.....	425	VII. Getting Acquainted, The	
Forest Ranger, The (Poem)—P. C.		Maples and Birches.....	501
Smith.....	308	Forestry, Prize for an Essay on.....	149
Forest Ranger, One View of the—Paul G.		Forestry Progress, Pennsylvania.....	886
Redington.....	268	Forestry, Woodlot—R. Rosenbluth (For	
Forest Seeds, Pests in.....	588	the Instruction of Owners of Farms	
Forest Service and Public—Paul G.		and Country Estates).....	118
Redington.....	511	Forests as Bird Sanctuaries, State—	
Forest Streams, Trout in.....	591	William P. Wharton.....	211
Forest Supervisor in the Community, The		Forests as Recreation Grounds, National	
Place of a—Paul G. Redington....	182	—W. J. Morrill.....	641
Forest? What is a National—T. W.		Forests, Fish for the—L. F. Kneipp.....	697
Venemann.....	735	Forests in the War Zone, French—S. T.	
Forest Working Plans. Reconnaissance:		Dana.....	769
Its Relation to—R. H. Boerker....	22	Forests, Lumber and Consumer—E. T.	
Forested Shore Line, Sixteen Thousand		Allen.....	745
Miles of—E. A. Sterling.....	319	Forests of Southern South America,	
Forester—Arborist—Alfred Gaskill.....	906	Hardwood—H. G. Cutler.....	248
Forester Should Be, What a—Dr. C. A.		Forests, The Government.....	55
Schenck.....	154	French Forests in the War Zone—Samuel	
Forester, The Bavarian—G. H. Colling-		T. Dana.....	769
wood.....	626	Full Title Under the Weeks Act.....	153
Foresters, Filipino.....	743	Game, A Chance for the—Smith Riley... 594	
Foresters in the Great War—S. T. Dana..	858	Game and Fish Increase—Prof. D. Lange	
Forestry Address to Students—Dr. H. S.		Game Preserve, State Forest as—Ernest	
Drinker.....	207	O. Buhler.....	343
Forestry Addresses for Students.....	57	German Sawmills, Utilization at—Nelson	
Forestry and Water Resources, The		C. Brown.....	201
South's—Henry S. Graves.....	377	Glaciers of Mt. Rainier, The—F. E.	
Forestry at Chautauqua.....	430, 591	Matthes.....	646

	<i>Page</i>		<i>Page</i>
Glynn for Forestry, Governor.....	151	Law, Better Forest Fire—W. R. Fisher...	370
Government Forests, The.....	55	Law in South Carolina, Need of a Forest .	228
Government Makes Largest Offering of Timber.....	154	Law Violators, Arrest Fire.....	571
Governor Glynn for Forestry.....	151	Legislation in Virginia, Important Forestry	224
Grand Coulee, The—Winthrop P. Haynes	346	Lightning, Fires Caused by.....	437
Grazing for Eleven Million.....	436	Loblolly Pine Adapted to Forestry.....	231
Greatest Woodlot, The World's—George S. Long.....	632	Lodgepole Pine for Poles.....	381
Grounds, National Forests as Recreation— W. J. Morrill.....	641	Logger in the Sierras, The Early—Alex- ander W. Dodge.....	815
Growth, A Catalpa.....	756	Logging A River Bottom—Edward F. Bigelow.....	669
Guard on Patrol, The Fire (Poem)— “J. D. G.”.....	707	Longleaf Pine, Best Seed Year for.....	307
Half of Each Tree Lost.....	438	Lookout, A Woman as a Forest Fire....	174
Handles by Weight, Buying.....	880	Look Out on Mount Lassen, The— William C. Hodge.....	568
Handling Lumber by Cableway.....	673	Lookout Tower, Constructing Emergency.	372
Hardwood Forests of Southern South America—H. G. Cutler.....	248	Lumber and Consumer, Forests—E. T. Allen.....	745
Hardwoods of the Spessarts, The—F. F. Moon.....	298	Lumber by Cableway, Handling.....	673
Hemlock, The Story of—Hu Maxwell....	577	Lumber Camps, Conservation of Life in the—Mabel T. Boardman.....	52
Herding, New Style Sheep.....	526	Lumber Industry, Studying the.....	730
Heroes, My (Poem) by J. R. Simmons....	576	Lumber Industry, The War and the— Bristow Adams.....	617
Hetch Hetchy Timber Affected.....	150	Lumber Trade, The European War and the—R. C. Bryant.....	881
Honest Foreman, An (Poem)—Tran- scribed by E. M. Price.....	688	Lumber Trade, The Panama Canal and the —R. C. Bryant.....	81
Houses, Boys Make Bird.....	753	Lumberman's Views, A.....	514
How Would You Do It?.....	372	Lumbermen, Conservation for.....	418
Important Forestry Legislation in Virginia	224	Lumber Trade and the Canal—Robert Dollar.....	499
Improvement in Range Conditions— Albert F. Potter.....	110	Man To a Tree, A (Poem)—Gertrude Cornwell Hopkins.....	267
Index for American Forestry for 1913....	149	Management of Woodlots, Business—R. Rosenbluth.....	185
Industry, Studying the Lumber.....	730	Many Uses for Birch.....	66
Industry, The War and the Lumber— Bristow Adams.....	617	Many Uses of the Forests.....	365
Initiating a State Forest Policy in Ken- tucky—J. E. Barton.....	135	Maple Is Holding Its Own.....	67
Injury to the Larch by Sawfly Larvae— Maud DeWitt Pearl.....	528	Maryland Conservation Association.....	303
Insect Problem, National Organization to Study Forest.....	68	Massachusetts Wants State Forests.....	155
Irrigation, Conference on.....	278	Meadows of the Sierra, The—Neal T. Childs.....	788
Land, Federal Power Supreme on Federal.	12	Meadows, Our Mountain—Harold C. Bradley.....	406
Larch by Sawfly Larvae, Injury to the— Maud DeWitt Pearl.....	528	Meetings: See “Conventions”	
Largest Tree Trunk, World's.....	678	Memorial, A Sylvan—W. R. Fisher.....	153
Lariat Laura's Fatal Form, Ranger Young Wild on the Fire Line, Or—E. T. Allen.....	496	Minnesota, Wild Life in—Prof. Charles Johnson.....	414
Lassen, The Lookout on Mount—William C. Hodge.....	568	Missouri Ouster Cases.....	602
Law, A Roadside Tree—Chapin Jones....	674	Monster, A Florida.....	683
Law, A South Carolina Forestry.....	152	Mount Lassen, The Lookout on—William C. Hodge.....	568

	<i>Page</i>		<i>Page</i>
Mount Rainier, The Glaciers of—F. E. Matthes.....	646	Pests in Forest Seeds.....	588
Mountain Meadows, Our—Harold C. Bradley.....	406	Philippine Forest Concession.....	524
Mountain Purchase, A White.....	733	Pike's Peak, Forest Planting on—George A. Duthie.....	14
My Heroes (Poem)—J. R. Simmons.....	576	Pine Adapted to Forestry, Loblolly.....	231
National Forest Administration, The—David F. Houston.....	867	Pine, Best Seed Year for Longleaf.....	307
National Forest, Fire Protection on the Ozark—Francis Kiefer.....	71	Pine Growing Profitable, White.....	306
National Forest? What is a—T. W. Venemann.....	735	Pine, The Torrey—Eloise Roorbach.....	92
National Forests as Recreation Grounds—W. J. Morrill.....	641	Pines, Destroy Diseased.....	498
National Organization to Study Forest Insect Problem.....	68	Pines Menaced, White.....	444
National Park, For an Appalachian—Donald Gillis.....	37	Pines, Trying to Save Primeval.....	51
National Reclamation, An Epitome of—C. J. Blanchard.....	393	Pioneer in Forestry, George W. Vanderbilt—Overton Westfeldt Price.....	420
Native Alaskans, Conserving.....	751	Pisgah Forest Purchased.....	425
Need of a Forest Law in South Carolina..	228	Place of a Forest Supervisor in the Community, The—Paul G. Redington..	182
New Jersey Forestry Exhibit Effective...	802	Planting and Seeding of Woodlots—George Latta Barrus.....	287
New Style Sheep Herding.....	526	Planting on Pike's Peak, Forest—George A. Duthie.....	14
New Type of Fire Line, A—M. A. Benedict	281	Planting, Private Tree.....	592
New York's City Trees.....	560	Poles, Lodgepole Pine for.....	381
New York State Forestry Association, Annual Meeting.....	155	Policy in Kentucky, Initiating a State Forest—J. E. Barton.....	135
Numerous Forest Fires.....	516	Poplar Profitable, Yellow.....	366
Nursery Stock, The Blights of Coniferous Observations on the Black Forest, Some—F. F. Moon.....	31	Practical Tree Surgery—J. Franklin Collins.....	719
Oldest Tree, The World's.....	486	Preserved, Scenic Forest.....	513
One View of the Forest Ranger—Paul G. Redington.....	268	Preserves Timbers, Salt Lake.....	302
Our Mountain Meadows—Harold C. Bradley.....	406	Primeval Pines, Trying to Save.....	51
Our Vanishing Food Fish—J. Charles Linthicum.....	543	Private Reforestation—M. H. Hoover...	820
Ouster Cases, Missouri.....	602	Private Tree Planting.....	592
Ozark National Forest, Fire Protection on the—Francis Kiefer.....	71	Prize for an Essay on Forestry.....	149
Pacific Coast Conditions.....	500	Profitable, Yellow Poplar.....	366
Pacific Northwest, Timber Estimating in the—H. J. Brown.....	69	Progress in British Columbia—Overton Westfeldt Price.....	273
Panama Canal and the Lumber Trade, The—R. C. Bryant.....	81	Protection, Example of Fire—Jack Guyton	345
Pasture, The Stony—Warren H. Miller (Forestry on the Country Estate)..	101	Protection in California, Fire—Knower Mills.....	679
Patrol, The Fire Guard on (Poem)—"J. D. G.".....	707	Protection on the Ozark National Forest, Fire—Francis Kiefer.....	71
Pennsylvania Forestry Progress.....	886	Protection, West Virginia Fire.....	731
Pennsylvania, The Sprag Industry of Eastern—John L. Strobeck.....	142	Protective Work, Fire.....	677
		Public, Forest Service and—Paul G. Redington.....	511
		Public Knowledge of Forest Economics—E. T. Allen.....	58
		Pulp, Balsam Fir for.....	509
		Pulp for Sausage Casing, Wood.....	804
		Purchase, A White Mountain.....	733
		Purchased, Pisgah Forest.....	425
		Range Conditions, Improvement in—Albert F. Potter.....	110

	<i>Page</i>		<i>Page</i>
Ranger, One View of the Forest—Paul G. Redington.....	268	Sawfly Larvae, Injury to the Larch by—Maud DeWitt Pearl.....	528
Ranger, The Forest (Poem)—P. C. Smith.....	308	Sawmills, Utilization at German—Nelson C. Brown.....	201
Ranger Young Wild on the Fire Line, Or Lariat Laura's Fatal Form—E. T. Allen.....	496	Scenic Forest Preserved.....	513
Rainier, The Glaciers of Mt.—F. E. Matthes.....	646	Scouts Trail Building, Boy.....	446
Reclamation, An Epitome of National—C. J. Blanchard.....	393	Seeding of Woodlots, Planting and—George Latta Barrus.....	287
Reconnaissance: (Its Relation to Forest Working Plans)—R. H. Boerker... ..	22	Seeding Operation, Spring.....	355
Recreation Grounds, National Forests as—W. J. Morrill.....	641	Seeds, Pests in Forest.....	588
Redwood of California, The—J. H. Browne.....	795	Service and Public, Forest—Paul G. Redington.....	511
Reforestation, Private—M. H. Hoover... ..	820	Shade Trees, Baltimore's—R. Brooke Maxwell.....	805
Reindeer, A Trip for—Arnold Hanssen... ..	811	Shade Trees, Care of.....	302
Reports, Forestry Committee.....	145	Shade Tree Worth? What is a.....	241
Resources, The South's Forestry and Water—Henry S. Graves.....	377	Sheep Herding, New Style.....	526
Reviews, Book:		Shore Line, 16,000 Miles of Forested—E. A. Sterling.....	319
Logging, by R. C. Bryant.....	311	Sierras, The Early Logger in the—Alexander W. Dodge.....	815
Economic Woods of the United States—Samuel J. Record.....	311	Sierra, The Meadows of the—Neal T. Childs.....	788
A Forest Idyl—Temple Oliver.....	311	Sixteen Thousand Miles of Forested Shore Line—E. A. Sterling.....	319
Trees in Winter—Albert F. Blake-slee and Chester D. Jarvis.....	311	Small Fire Loss.....	706
The Commuter's Garden—W. B. Hayward.....	311	Soap Material, A New.....	306
The Farm Woodlot—E. G. Cheyney and J. B. Wentling.....	538	Some Observations on the Black Forest—F. F. Moon.....	31
The Training of a Forester—Gifford Pinchot.....	538	South America, Hardwood Forests of Southern—H. G. Cutler.....	248
Lumber and Its Uses—R. S. Kellogg.....	538	South Carolina Forestry Law, A.....	152
The First Exposition of Conservation and Its Builders—W. M. Goodman.....	834	South Carolina, Need of a Forest Law in.....	228
Elements of Forestry—Frederick Franklin Moon and Nelson Courtlandt Brown.....	834	South's Forestry and Water Resources, The—Henry S. Graves.....	377
River Bottom, Logging a—Edward F. Bigelow.....	669	Spessarts, Hardwoods of the—F. F. Moon.....	298
River, The Wrath of the (Poem)—Rachel L. Dithridge.....	527	Sprag Industry of Eastern Pennsylvania, The—John L. Strobeck.....	142
Roadside Tree Law, A—Chapin Jones....	674	Spring Seeding Operation.....	355
Russia's Forest Famine.....	443	State Forest as Game Preserve—Ernest O. Buhler.....	343
Safe Camp Fireplace, A.....	732	State Forest Policy in Kentucky, Initiating a—J. E. Barton.....	135
Salt Lake Preserves Timbers.....	302	State Forests as Bird Sanctuaries—William P. Wharton.....	211
Sausage Casing, Wood Pulp for.....	804	State Forests, Massachusetts Wants....	155
Save \$100,000,000 A Year, How to.....	304	State News: (Department of Magazine)	
Save Primeval Pines, Trying to.....	51		73, 159, 231, 312, 386
Save This Forest Land.....	342	State Work:	
		California.....	387, 679, 893
		Georgia.....	159, 386
		Kentucky.....	135, 159, 312
		Louisiana.....	313
		Maine.....	73, 232, 386

	<i>Page</i>		<i>Page</i>
Massachusetts.....	74, 155, 232, 313	Timber, Government Makes Largest Offer-	
Michigan.....	159, 233, 384	ing of.....	154
Minnesota.....	157, 387	Torrey Pine, The—Eloise Roorbach....	92
Missouri.....	312	Trade and the Canal, Lumber—Robert	
Montana.....	567	Dollar.....	499
New Hampshire.....	387	Trail Building, Boy Scouts.....	446
New Jersey.....	231, 314	Tree, A Man to a (Poem)—Gertrude	
New York.....	74, 314, 560	Cornwall Hopkins.....	267
North Carolina.....	74, 232, 313	Tree Filling.....	718
Ohio.....	312	Tree Law, A Roadside—Chapin Jones....	674
Pennsylvania.....	75, 159, 233, 312, 886	Tree Lost, Half of Each.....	438
Rhode Island.....	233	Tree Planting, Private.....	592
South Carolina.....	152, 228	Tree Surgery, Practical—J. Franklin	
South Dakota.....	387	Collins.....	719
Vermont.....	312	Tree, The World's Oldest.....	486
Virginia.....	151, 224, 305	Tree Troubles—Warren H. Miller (Fores-	
Washington.....	571	try on the Country Estate IV.)....	261
West Virginia.....	731	Tree Work, A City's.....	489
Streams, Trout in Forest.....	591	Tree Worth? What is a Shade.....	341
Street Tree Planting in a Western Town—		Trees, Baltimore's Shade—R. Brooke	
W. W. Robbins.....	403	Maxwell.....	805
Stock, Drift Fences for.....	433	Trees, Care of Shade.....	302
Stone, A Forest of—F. H. Knowlton....	709	Trees, New York's City.....	560
Stony Pasture, The—Warren H. Miller		Trip for Reindeer, A—Arnold Hanssen... 811	
(Forestry on the Country Estate)..	101	Trout in Forest Streams.....	591
Story of Hemlock, The—Hu Maxwell....	577	Trunk, World's Largest Tree.....	678
Students, Dr. Drinker's Forestry Address		Trying to Save Primeval Pines.....	51
to.....	207	Unlocking Alaska.....	469
Students, Forestry Addresses for.....	57	Uses of the Forests, Many.....	365
Studying the Lumber Industry.....	730	Using Blighted Chestnut.....	604
Stumper of a Fence, A—Edward F.		Utilization at German Sawmills—Nelson	
Bigelow.....	708	C. Brown.....	201
Substitutes, Wood Versus Some of its—		Vancouver, Forestry Conference at.....	64
R. C. Bryant.....	239	Vanderbilt Dead, George W.....	303
Supervisor in the Community, The Place		Vanderbilt, Pioneer in Forestry, George W.	
of a Forest—Paul G. Redington... 182		—Overton Westfeldt Price.....	420
Surgery, Practical Tree—J. Franklin		Virginia, Forestry Law for.....	151, 305
Collins.....	719	Virginia, Important Forestry Legislation	
Switzerlands in America, The—Agnes C.		in.....	224
Laut.....	839	War and the Lumber Industry, The—	
Sylvan Memorial, A—W. R. Fisher.....	153	Bristow Adams.....	617
Tackling Tamalpais—Frederick E. Olm-		War and the Lumber Trade, The European	
sted.....	887	—R. C. Bryant.....	881
Tahiti—E. T. Allen.....	870	War, Children Wage.....	415
Tamalpais, Tackling—Frederick E. Olm-		War, Foresters in the Great—S. T. Dana. 858	
sted.....	887	War Zone, French Forests in the—S. T.	
The Fire Guard On Patrol (Poem)—		Dana.....	769
"J. D. G.".....	707	Warnings Against Fires.....	371
Thirty-Three Thousand Acres More		Water Resources, The South's Forestry	
Purchased.....	523	and—Henry S. Graves.....	377
Timber Affected, Hetch Hetchy.....	150	Weeks Act, Full Title Under the.....	153
Timber Estimating in the Pacific North-		Weight, Buying Handles by.....	880
west—H. J. Brown.....	69	West Virginia Fire Protection.....	731

	<i>Page</i>		<i>Page</i>
Western Town, Street Tree Planting in a—		Woodlot Forestry—R. Rosenbluth (For	
W. W. Robbins.....	403	the Instruction of Owners of Farms	
What a Forester Should Be—Dr. C. A.		and Country Estates).....	118
Schenck.....	154	Woodlot, The—Warren H. Miller (For-	
What is a National Forest?—T. W.		estry on the Country Estate).....	1
Venemann.....	735	Woodlot, The World's Greatest—George	
What is a Shade Tree Worth?.....	341	S. Long.....	632
White Mountain Conference.....	525	Woodlots, Business Management of—R.	
White Mountain Purchase.....	523	Rosenbluth.....	185
White Mountain Purchase, A.....	733	Woodlots, Fence Off.....	814
White Mountain Winter Work.....	380	Woodlots, Planting and Seeding of—	
White Pine Growing Profitable.....	306	George Latta Barrus.....	287
White Pines Menaced.....	444	World's Greatest Woodlot—George S.	
Wild Life in Minnesota—Prof. Charles		Long.....	632
Johnson.....	414	World's Largest Tree Trunk.....	678
Winter Forest Fires.....	308	World's Oldest Tree, The.....	486
Winter Work, White Mountain.....	380	Wrath of the River, The (Poem)—Rachel	
Woman as a Forest Fire Lookout, A....	174	L. Dithridge.....	527
Wood, Annual Consumption of.....	897	Yellow Poplar Profitable.....	366
Wood Pulp for Sausage Casing.....	804	Yellowstone Park, Elk from.....	72
Wood Versus Some of its Substitutes—		Yosemite National Park, Annual Report	
R. C. Bryant.....	239	on.....	159

American Forestry

Vol. 20

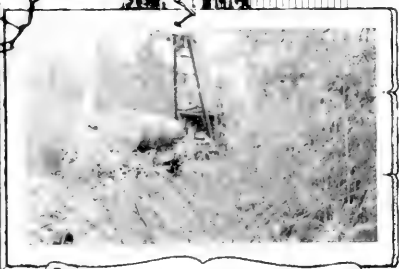
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CONTENTS

1914

COVER PICTURE—"GROWN UP SO THICK WITH SAPLINGS THAT IT IS HARD TO GET ANYWHERE NEAR THE BROOK."	
FORESTRY ON THE COUNTRY ESTATE (to be continued)—By Warren H. Miller.....	1
With ten illustrations.	
FEDERAL POWER SUPREME ON FEDERAL LANDS.....	12
THE ANNUAL MEETING.....	13
FOREST PLANTING ON PIKE'S PEAK—By Geo. A. Duthie.....	14
With five illustrations.	
RECONNAISSANCE: ITS RELATION TO FOREST WORKING PLANS—By R. H. Boerker.....	22
With eight illustrations.	
SOME OBSERVATIONS ON THE BLACK FOREST.....	31
With six illustrations.	
FOR AN APPALACHIAN NATIONAL PARK—By Donald Gillis.....	37
With six illustrations.	
FOREST CONSERVATION AND AGRICULTURE—By Theodore S. Woolsey, Jr....	44
With five illustrations.	
SAVING THE PRIMEVAL PINES OF NEW HAMPSHIRE.....	51
With one illustration.	
CONSERVATION OF LIFE IN THE LUMBER CAMPS—By Miss Mabel T. Boardman.....	52
With one illustration.	
THE GOVERNMENT FORESTS.....	55
PUBLIC KNOWLEDGE OF FOREST ECONOMICS—By E. T. Allen.....	58
FORESTRY CONFERENCE AT VANCOUVER.....	64
THE BLIGHTS OF CONIFEROUS NURSERY STOCK.....	65
MANY USES FOR BIRCH.....	66
MAPLE IS HOLDING ITS OWN.....	67
NATIONAL ORGANIZATIONS TO STUDY FOREST INSECT PROBLEMS.....	68
FOREST PRODUCTS EXPOSITION BULLETIN.....	69
TIMBER ESTIMATING IN THE PACIFIC NORTHWEST—By H. J. Brown.....	69
FIRE PROTECTION ON THE OZARK NATIONAL FOREST—By Francis Kiefer..	71
ELK FROM YELLOWSTONE PARK.....	72
FOREST NOTES.....	73
STATE NOTES.....	73
CURRENT LITERATURE	76

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VOL. XX

JANUARY, 1914

No. 1

FORESTRY ON THE COUNTRY ESTATE

BY WARREN H. MILLER.

I. THE WOODLOT.

IN almost every newly purchased country place there is considerable wooded area and rocky ground, the woodlot and stony pasture of the erstwhile farm. The new owner looks them over in some perplexity. He had set out to plan his estate with an eye to aesthetic beauty, to surround himself with pleasing vistas, rolling swales of green things growing, live stock and buildings that would be a pride and pleasure to the eye; but here are some thirty or forty acres of "just woods," with perhaps a brook, for the most part brush and thicket, and, as for the stony pasture he sees a debit of a good many hundred dollars spent on stoning it before it will ever be ready for the plow. In fact an eye-sore of several acres of stony ground has often been the deterrent to the purchaser of an abandoned farm having otherwise excellent possibilities.

Yet the exercise of a little practical forestry, such as every country gentleman should be reasonably conversant with, would cover the stony pasture with thriving trees at far less expense than stoning, and transform the brushy woodlot into a noble forest that will be a favorite place in your walks in the cool of the evening when the thrushes are singing.

Forestry does not mean, as popularly supposed, a mere knowledge of the various tree species plus a familiarity with mensuration and log scaling. It goes far beyond that. It is the science of handling large masses of trees, of securing their reproduction in the same

species over vast areas, of protecting them from fire and insects, of seedling, nursery and planting operations done on a scale of millions of trees. Not only must the forester be familiar with the identifying characteristics of our forest tree species but he must know what soil base a given tree prefers, what its climatic requirements are, what rain supply it thrives best under, the years a stand takes to reach maturity, the strength and value of its timber, the disposal of its by-products and thinnings, its autumn coloration, date and duration of spring flowering, seed distribution—a thousand details which act and react in the busy life of a forest of growing trees. It is a fascinating profession, and one that will appeal strongly to our youths of the future, a profession that will be a long while becoming crowded, for our State and national forest services are destined to be the greatest of all our Government enterprises and can at present use every graduate of our forest schools.

But the country gentleman requires no such formidable array of scientific attainments as does the trained forester in order to practice the simple operations of making a forest of his woodlot and reclaiming his stony pasture. Let us assume at the outset that he already has all the arable land that he can manage; that the correct balance of plant and animal life has been already seen to or planned for; that the land to be devoted to forestry will give its very best commercial yield when so treated. While it is well to combine the aesthet-



MAKING A NOBLE GROVE OUT OF THE ERSTWHILE WOODLOT.

ic with the practical in running your country place, let us not lose sight of the dollar in our desire for beauty; and do not for a moment assume that forestry is in any sense a non-paying aesthetic luxury. It is the most practical thing you can do.

I know of no more pleasurable art than the amelioration of the prosaic farm woodlot. By the judicious use of the axe and the planted tree it can be made a forest of surpassing beauty, an abode for birds and wild things; a place of vistas, of cool shady ravines where the silvery sheen of balsams and the feathery fronds of hemlocks contrast with the glowing greens of oaks and maples; of clean open groves, where towering shagbarks and tulip trees and sweet gums raise their green canopy far overhead and the forest floor beneath is cool and sweet and grassy and there are wood lilies about.

A touch of the axe here and there, a restoration by replanting of the trees that nature originally grew in profusion, above all a fine sense of what to take

and what to leave, a knowledge of where to look for features which may be wrought into points of beauty—these are the brain tools that you must bring to the abandoned woodlot.

A knowledge of what to leave is your first essential. Here is a pig-nut hickory, recognizable by its seven-leaflet leaf and its small thin-shelled, bitter hickory nut. The farmer will tell you that it is worthless and had better be marked for firewood—but not so the forester. In the autumn that tree will be a flaming shaft of pure pale yellow and if it is in a position where it can be featured (and it usually manages to grow in just such a position) you had best save it. Again: we are thinning a clump of maples in order that the dominant ones may become large and fine. Which shall be marked? Look well then to their leaves; this one's a soft maple, its feathery leaf betrays it; away with it and give the sugar maples a chance! There is a red maple, identified by its round-based, toothed leaf. Shall we mark it for the axe? Not so



WHITE PINE AND RED SPRUCE ON THE LAKE ISLANDS.

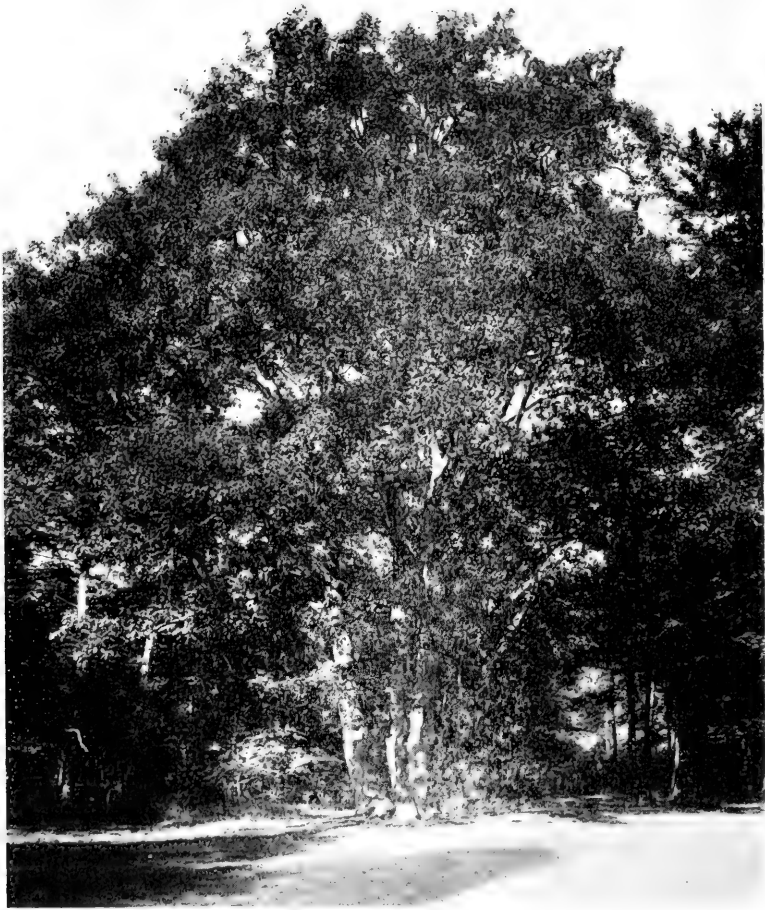
fast, for on these high dry ridges, growing in company with the sugar maples, the red maple puts on the most amazing solid dark reds imaginable in the fall, and it is sure to be a landscape feature. Better take these two spindly sugar maples instead. Again: suppose you find a few ash trees in the woodlot. Why are there not more of them, and will it be safe to take any of them without risking their total disappearance?

You will observe that a knowledge of the tree species is one of the essentials for the practice of intelligent woodlot forestry; not merely their identification characteristics but what each species is valuable for commercially and aesthetically, what soils it prefers, how much moisture it needs.

There are not very many species grown by nature in any one forest. I once made for my good friend, Prof. Hickel, of Versailles, France, a collection of American tree seeds from the forest of Interlaken, where I live. There were thirty-two species represented, not such a very great number to become acquainted with if you are going to make something of your woodlot, for these are the materials with which you must work. You should know the five pines, four spruces, seven oaks, four maples, four hickories, four birches, ten miscellaneous hardwoods and five miscellaneous conifers that constitute the bulk of any forest population. The species

shift as you go East or West, North or South; some drop out and new ones come in, but the total number of species represented in your particular woodlot will remain about the same; in all some forty-five tree species. Some of these prefer swampy soils, others the borders of streams, still others rich moist bottom lands or high dry ridges. Some will be valuable to you for timber and firewood, others for their special uses in the arts, some will be fit for neither but will be most valuable to you because of their beauty and their wonderful autumn colorations.

You should familiarize yourself with the identification characteristics of these tree species from some good tree book, such as Romeyn B. Hough's "Trees of North America," or Julia E. Rodgers' "Book of the Trees." It is pleasant study in itself and surely a knowledge that you should have in mind before attempting to put into practice the suggestions in these articles. I give you in addition a working table of the forty-five species representative of woodlot conditions in the Middle Atlantic States, showing in condensed form their natural climatic limits, preferred soils, sunlight requirements, size and value of timber, dates of leafage, flowering, seed ripening, and autumn colorations. With a few substitutions the table will answer as far West as the Mississippi River. The dates are based on observations during



THE WHITE OAK—ONE VAST BANK OF PURPLISH COPPER IN MID-OCTOBER.

the last five years in the latitude of Asbury Park, N. J. Add or subtract two weeks for every 100 miles north or south to get approximately the correct dates in your own latitude.

With this working table and a reasonable proficiency in identifying trees let us visit the woodlot and take, as it were, a census of stock in hand. We are going to use the axe a whole lot, but not without knowing just what we are doing and just what effects we expect to produce. You will find that your first desire will be to have a reasonably complete representation of the various trees occurring in your locality so that your woodlot will also be an ar-

boretum on a small scale. You will also be delighted to discover quite a number of specimens outside of the immortal forty-five, and may tabulate, including the shrubs, some sixty-five to seventy species in getting acquainted with the fascinating tree neighbors that inhabit your woodlot.

Be also at the same time on the keen lookout for "possibilities." By that I mean those little delicious bits of landscape that Nature has already been working over, the kind that the artist's sensitive perception seizes upon—natural groves; brook vistas; a woodsey meadow filled with riotous sumac and a magnificent scarlet oak growing in it,



CONVERTING A SWAMP INTO A LAKE BY DREDGING AND DAMMING AS WAS DONE AT WYNDYGHOU L BY MR. ERNEST SETON THOMPSON.

with a colony of great crested flycatchers perched in its top. The artist will use, in his way, the axe, just as you will do—his brush eliminates this and that feature that his feelings tell him constitute ugliness; and he may even paint in something that never was there—just as you can plant in something that Nature is crying aloud for but doesn't happen to have in this particular spot.

At first blush it seems perfectly hopeless to expect of the average woodlot any development into a sylvan paradise. The trees are all about the same size and seem very much alike. Many of them are dead or dying; the underbrush is so thick that one keeps to the old lumber roads, and as for the brook ravines they are grown up so thick with saplings that it is hard work to get anywhere near the brook! There isn't any grove nor anything that in the least resembles one; the meadow and the ravines we grant you, we have them—such as they are.

Precisely; this is just where one

starts—with the idea that this woodlot is “just trees and brush.” Later, when you have a bowing acquaintance with the forty-odd tree species you will feel differently about it and will begin to see a light. The high ground bordering ravines you will find populated with sturdy dominant trees, hemmed in on all sides by suppressed and crooked ones, under which again is a tangle of slender saplings bending every which way like a thicket of fish poles. A study of the tops of your biggest trees will show you that the branches reach far, interlacing with the suppressed tops and fighting with them for light and sunshine. If only these big fellows could be left, with their tops just touching, what a magnificent growth they would make! Well, let the axe do it and note how soon you have a grove that is an inspiration to walk in. The dominant trees will be, in general, beech, red oak, white oak, pin oak, shagbark hickory, tulip tree, red maple, rock maple, sweet gum. You want the beech because of its magnificent spreading growth and



WHAT SPRUCES CAN DO FOR A FOREST SCAPÉ IN WINTER.

its winter coloration. It is one of the few trees whose leaves stay on all winter, giving you a big flame of brown-yellow to show against the white of the snow and the gray of the bare trees. And if you can clear the way for some thrifty young six-inch specimen that is already succeeding, it will astonish you with its subsequent rapid growth. The white oak you save, always and every time. Not only for its fine timber, beautiful bark, and stately spread of branches, but for its foliage effects. By the middle of October it will be one vast bank of purplish copper, then brown, and finally light yellow-brown, hanging on through the winter and helping the beech to keep the forest cheerful. If you plant enough pyramidal spruces, feathery white pines and sap-green pitch pines to paint in dashes of color contrasting with the tawny beeches and oaks, you can always be sure that your snowy forest hillsides will be beautiful in December, January and February. Look at the Adirondacks in winter if you would realize what spruces can do for a hardwood forestscape in winter.

And do not let anyone persuade you to keep the red oak in preference to the white. It is true that it grows slightly faster, reaching maturity ten years ahead of the white, but it is a flashy tree having no lasting beauty or utility and its big glossy green leaves turn to a dull brown in autumn without giving us any color, after which they drop off and cumber the forest floor. Its wood is reddish and brashy, giving the tree its name, and in no way to be compared to the wood of the white oak. For vivid reds in autumn we must look to the scarlet oak, black oak and the pin oak, not the red. The pin oak prefers rich loamy creek bottoms and those flat tables at the bottom of ravines that are overflowed by spring freshets. If there is a pin oak in your grove, save it for its autumn colors and its pretty little round acorns.

Of the hickory family the shagbark will stay and be favored because of its nut crop. The mockernut is also edible, and gives you a tremendous flare of orange in the fall, while all the shagbark can offer in that line is a dull



THE PLACE TO PLANT HEMLOCKS.

brown. The pignut hickory is worthless except for its wonderful pale yellow in autumn, so that it should not be spared unless scenic features can be gotten with it in autumn. It is particularly valuable on a hillside. Sweet gum is that tree with the star-shaped leaves that turn a magnificent dark-purple in autumn. It is the only purple we have that stays, as the oak and ash pass quickly through purple to brown, and the black gum goes to red. Another feature of the sweet gum is its straight columnar trunk, straight as a spruce, not a branch on it to the fork of the crown, a handsome feature in any grove. You will not get this when it borders an open space, but the compensations in increased foliage more than repay. As for the *liriodendron*, the tulip tree, lucky the man who finds one growing in his prospective grove! Not only its great handsome leaves turning violent yellows in the fall, not only its showy tulip flowers, but above all its towering shaft of a trunk, straight as a lance, sturdy as a factory chimney, makes it an imposing tree in either landscape or forest.

As to maples, save the best of your red maples for they and the black willows are the very first trees to show color in the spring. Look along the edges of a forest about the end of March and note here and there splotches of deep red. These are the flower buds of the red maple and a few weeks later the woods will be fragrant with their perfume. I have a great many of them about me in the Interlaken forest and have given considerable study to their autumn color phases. The red maple may have all yellow leaves or yellow and red mixed or all red. The difference seems to lie in soil and root conditions. Where the roots have to fight for nourishment, as in wet swampy soils or dry arid ones, the autumn leaves will be red or even one solid flame of dark purple. On the other hand with rich well-drained soils it will turn a pure pale yellow, and there are all sorts of graduations between.

The sugar maples you will know at once by their smooth-edged pointed leaves with pointed base-lobes, whereas all the red maples have rounded, toothed base-lobes. The sugar maple does not thrive much south of latitude 42° but

north of that it drives out the red maple except in the swamps where it can not grow. Its autumn colors are gorgeous reds and yellows, its timber is exceeding fine and valuable, and you can tap the sturdy ones for maple syrup in the spring when you hear the first bluebird. A three-quarter-inch auger hole put in four inches with a wooden spigot driven in will yield you three pounds of maple sugar to the tree. The juice of the red maple is by no means as plentiful or of as fine quality as the sugar maple.

To conclude the matter of the grove. Having found a fine dry locality already populated with sturdy trees bigger than the average, clean out the underbrush, and thin out all the crooked, spindling and dying trees that are obviously hampering the growth of the others. Aim to leave the canopy overhead in such shape that it will close up solid in a few years. You will find that your big fellows in doing this will have grown to really noble proportions. And I would not introduce evergreen here if I were you—a grove of Druidical oaks is your effect—but I would plant nursery saplings where you perceive such-and-such a tree is urgently needed. A nursery sapling has not only a more compact and vigorous root system but it grows much faster than the forest transplant. A three-inch nursery sapling will reach 12 inch diameter of trunk in twenty years in all the standard deciduous trees, whereas our forest-grown oaks and maples seldom reach 12 inches inside of their fiftieth year. I have had such poor results in transplanting all sizes and kinds of forest trees that I have come to regard the nursery sapling as cheaper, quicker and better except in a few special cases.

Assuming that your woodlot has a brook, let us walk the length of it from boundary to boundary. Here it comes, tumbling down through a rocky dell—what a place for hemlocks and balsams! Perhaps Nature has already put in a few or rather, man has left a few survivors. There is nothing prettier than a feathery, dark-green hemlock overhanging a brook, and you are to study your vistas with an eye to hemlocks,

taking care, however, not to choose sites that will be washed out by spring freshets. And, for those little bottoms in the elbows and turns of the brook, there is no better tree than the silvery, aromatic balsam, the Christmas tree “spruce” of the city markets. Both it and the hemlock endure shade and will grow prodigiously if you but clear away the immediate saplings without attempting to disturb the larger trees overhead. At salient points along the ravine banks you will plant white pines. They also endure shade hardily and even a little State nursery transplant will become a very respectable tree, reaching in twelve years a diameter of three inches and a height of thirteen feet, and this under considerable shade from the forest trees.

As you progress down the course of the brook you will note that the crowding of saplings in the ravine is tremendous. You can not see the woods for the trees, to use an Irish bull. Nature is sure to have grown at vantage points along the bends, here a black birch, yonder a stunning red maple, on this point a fine beech or black gum—but you pass right by these unnoticed wonders because the eye is distracted by millions of tangled saplings all crowding and fighting for sunlight and room. Here is where the axe gets to work; and in planning for it aim to have each vista frame some strikingly beautiful tree bordering the brookside. You will be surprised to find how even a few bushes will spoil a most soul-satisfying view. Clear the way! Lay out a brookside trail and let it cross the brook whenever you have some particularly lovely landscape to show off. Here we come to a tiny water meadow, grown up with rank lush grasses, with alders and blackberries bordering the stream. What a place for willows! And the sunny meadow was particularly designed for a clump of tulip trees and sycamores. If Nature has not already been there before you better hie you to the nursery and invest in *salix nigra* and *Babylonica*, *Liriodendron*, *tulipifera* and *platanus occidentalis* forthwith.

Speaking of meadows, let us not forget to be on the lookout for them in the



A LAKE TWO FEET DEEP IS AS BEAUTIFUL AS A LAKE TWENTY FEET DEEP.

uplands throughout the woodlot. As a rule Nature provides these, as it were, breathing spaces, here and there in the forest, herself, fills them with wire grass and wild roses, golden rod and iron weed, and gives her bushes—sumacs, viburnums, thorns—a chance to spread out. Catbirds and thrashers and chewinks love these places, and nest in the low bushes. Flickers come here for worms and weed seeds, and the whole glade is surrounded by beady-eyed fly-catchers on the lookout for insects. The forest meadow is an amphitheater for sunloving trees. Around it gather the scarlet oaks, sweet gums, liriodendrons, blackberries—all of them one vast color scheme in the fall. Use the axe to favor them, for you will find the shade-enduring trees crowding in also; take out the red oak and leave the scarlet—what is two dollars' worth of lumber compared to fifty autumns of gorgeous scarlets! Take out that scraggly elm and favor the sweet gum, you need his red, yellow and purple stars in the autumn, and you need his button balls in the winter to the end that a colony of goldfinches may be attracted thither.

And you are likely to find a white

ash growing somewhere around this meadow. If not, plant one, for she is the undisputed queen of the forest. No tree excels it in beauty of form, foliage or autumn coloration. It wants plenty of sunlight and rich soil, and is a gross feeder, being known to foresters as the "wolf of the forest." Put in here also the American linden or basswood for its fragrant bee flowers, and leave a clump of persimmons in directing the activities of the axe, or else plant them in if you have none.

You have also to provide for winter coloration. All the trees above mentioned will be bare and gray in the winter, but you can paint in rich sap-greens with bushy sunloving pitch pines, points of green, blueberry—covered with red cedars—and feathery dark greens with your white pines. The conformation of your meadow will tell you just where to work in these effects. And do not, I beg of you, make a flat green lawn of your meadow and plant a border of rhododendrons, out in the sun where Nature never intended them to grow. If wild roses, golden rod, and purple iron-weed, with scarlet sumac and great walls of living color all about are not



ARTISTIC THINNING OF BIRCH THICKET.

your idea of an American forest meadow then you and I are thinking along different lines!

An old field in the forest irresistibly calls to mind the thickets with which Nature is wont to invade these places. To the layman the artistic treatment of the thicket seems the most hopeless task of all. It is just brush, and the quicker it is obliterated entirely the better, so it would seem. But, really, a great deal can be done with a thicket; in fact, a few judicious touches here and there will make you fall in love with it and ever after have a warm spot in your heart for the once despised "brush patch." A little analysis will show you

that it is almost invariably composed of trees that are wing-seeded or have sprung from bird-dropped seeds—birches, aspens, wild cherries, sour gums and the like. None of them will ever become imposing forest trees. There are two standard methods of treatment open to you; either use the thicket as a background to set off some fine specimens, or treat it frankly as a thicket and make it beautiful. Down in Southern Utah and Nevada Nature grows silver spruces and aspens together, a hint that we may put into practice by using the thicket as a background for blue spruces. They never look better than when contrasted against



LAGOON MADE BY DREDGING A SWAMPY BOTTOM.

living green walls or a tangle of gray twigs in winter. Any strikingly beautiful tree that does not grow over-large may be used in the same way—silver pine, scarlet oak, purple beech, green ash, ginko, sassafras, dogwood; and araucaria and deodar if you live south of the 40th parallel. Sink them well into the edge of the thicket so as to appear part of it.

In the second method of treatment you will get results by judicious cutting and planting. You have many fine colors available on your palette. If you live anywhere in the range of gray birch—Atlantic Coast west to Ohio and south to Virginia—you have a wonderful tree to work with. With its slender white trunks and its feathery, quaking foliage it is a strikingly interesting object, and a very few of them will tone up any thicket. They will grow anywhere, swamp or sand barren, and there really seems no excuse for their not occurring naturally farther West.

Another good thicket color is the Judas tree, *circis canadensis*. In the early spring its abundant pink flowers are out almost as soon as the red maples and its handsome green leaves help out the feathery birch foliage. You can get it at any nursery.

Thinning out is always good and salutatory in the thicket. In doing so, spare the sour gums, as its deep reds in the autumn are wonderful and the blue-black berries are a feast for robins, cedarbirds and flickers! Save the flowering dogwoods for their white blooms in the spring and red berries in the fall; and favor the wild cherries for their fragrant blossoms and handsome fruit. The trees to go will undoubtedly be black jack, scrub oak, yellow maple, thorn and alder. If there is a mature sweet gum anywhere near, there will surely be several young ones in the thicket. Be on the lookout for them, and clear away the brush about them,

an advantage which they will not be slow to use.

Finally—swamps. There are swampy spots and swampy creek bottoms in every woodlot and the best treatment I know is to drain the one and dam the other. A lake is just as beautiful two feet deep as twenty, and it will add immeasurably to the beauty of your forest. Before building your dam run a contour line at the lake level and see just where your backwater is going to come, also noting your high spots that will later become islands. All the trees that will have their stumps submerged within these boundaries will have to be taken out as they will surely die and will be infinitely harder to take out when surrounded by water than before the dam is built. The ones that will thrive on your islands and along the borders will

be red maple, pin oak, swamp white oak, bitternut hickory, black willow, white pine, tamarack, white cedar, red cedar, sour gum, white oak (if not too wet), black birch, hornbeam, and black spruce. With these and innumerable water-loving bushes to choose from you are in a fair way to astonish yourself with your island and lake border effects!

Having transformed your woodlot into a notable forest we will need all our knowledge backed by our bird and insect allies to defend your pet vistas against the attacks of insects, fungus, and fire. I hope to present you a paper containing some ideas along these lines in the future, but at present we must hurry on to the foresting of the stony pasture.

(To be Continued.)

FEDERAL POWER SUPREME ON FEDERAL LANDS

THE contention of the Government that power companies can not secure rights of way across national forests without complying with the regulations of the Secretary of Agriculture has been completely sustained, according to the officers of the Forest Service, by the opinion of the Circuit Court of Appeals filed on November 14 in the case of the United States versus the Utah Power and Light Company.

In its decision, the court announces that Congress has assumed complete control of the waterpower question, so far as the public lands are affected, and that a State in the exercise of its sovereign authority can not interfere with or transcend this constitutional power of Congress.

Since December 15, 1900, the Utah Power and Light Company has operated its hydro-electric power works on certain public lands in the State of Utah now forming a part of the Cache National Forest, and the United States sought to enjoin this occupancy until the

company should comply with the provisions of the Act of May 14, 1896. The power company alleged that its rights were secured and protected by the Act of July 26, 1866, now Section 2339 of the Revised Statutes.

The decision holds that the Act of May 14, 1896, empowering the Secretary of the Interior to permit, under general regulations to be fixed by him, the use of, or rights of way upon, the public lands and national forest reservations for the purpose of generating, manufacturing, and distributing electric energy, repeals the Act of July 26, 1866, insofar as it related to the subject of generating and distributing electric power and that the company must acquire its rights of way in accordance with the provisions of the later act.

The court denies the company's contention that it was protected in its tenure because that tenure was authorized by the laws of the State of Utah, exercising sovereign and exclusive jurisdiction with respect thereto.

It is predicted that western yellow pine will furnish an excellent source of turpentine as the southern pine becomes exhausted.

THE ANNUAL MEETING

The Annual Meeting of the American Forestry Association will be held at the New Willard Hotel, Washington, D. C., at 11:30 a. m., Wednesday, January 14, 1914.

This will be a business meeting, and there will be no papers or addresses or discussions on forestry, as pursuant to the arrangements made last autumn, our Association cooperated with the Fifth National Conservation Congress in the meetings of the Congress held in November, and sessions of the Congress were set aside especially for Forestry, at which it was arranged that the President of our Association should preside; in addition to which sectional meetings on Forestry were held and valuable forestry papers and reports were presented by our members, and discussions held. A large number of our members attended these meetings.

Members of the Association are asked to attend the annual meeting to aid in the transaction of the business matters to be discussed at that time.

P. S. RIDSDALE,
Secretary.

HENRY STURGIS DRINKER,
President.

FOREST PLANTING ON PIKE'S PEAK

BY GEO. A. DUTHIE, *Deputy Supervisor Pike National Forest.*

OF the countless thousands of acres of important watershed within the Rocky Mountains which have been rendered treeless by forest fires, none are more widely known or of greater economic importance than the Pike's Peak watershed within the Pike National Forest. The early history of Colorado is closely associated with the Pike's Peak region. The peak itself rises almost abruptly from the Great Plains at an altitude of 6,000 feet to an altitude of more than 14,000 feet. It was a prominent landmark for the first explorers and trappers who crossed the plains to the southern Rocky Mountains, and the first settlers who followed close behind them laid their course by the famous peak and settled in the surrounding country. Then came the discovery of gold in the Cripple Creek district at the western base of the mountain, and, as the story of fabulous wealth of the mines traveled afar, thousands of settlers rushed to the mining camps, which became small cities in a day. The region was therefore well settled at an early date.

When the first white men reached the Pike's Peak region they found it covered with an almost unbroken forest cover. With the advent of the settlers and prospectors forest fires became numerous. Early settlers have told of fires that raged for weeks unheeded, and these fires recurred year after year until thousands of acres were completely denuded of tree growth and the only virgin timber remaining was in small stands in the deep, protected canons. A careful reconnaissance of the region made in 1911 showed that there are over 10,000 acres of land from which all forest cover was consumed by these fires half a century ago, and upon which there has been practically no natural restocking. It is estimated that two or three centuries would elapse be-

fore these burns would again be fully reforested if natural regeneration were depended upon to produce a satisfactory forest cover. But these burns comprise important watersheds. The streams draining them furnish a domestic water supply as well as electric light and power to a number of tourist resorts, towns and cities, the chief of which is Colorado Springs, and so for economic reasons they must be restocked as soon as possible. Then, too, the fact that the Pike's Peak region is a recreation ground for thousands of tourists each year adds an aesthetic reason for immediate reforestation, to say nothing of the loss through the unproductiveness of so large an area which should be producing timber for the market. Since the natural restocking is so slow and the need so urgent, the reforestation of these burns has resolved itself into a large job of forest planting and sowing by artificial means which, to complete, will require a liberal appropriation and extensive planting operations annually for a number of years.

Already this work has been started. For several years past planting and sowing of coniferous seedlings and seeds has been done by the Forest Service on these burns in an experimental way. Various methods of reforestation have been tried with a view to solving as soon as possible the difficulties arising in the various situations, so that a systematic reforestation plan could be made. A preliminary plan was developed following the reconnaissance of 1911 which contemplates the reforestation of 10,594 acres at a cost of \$80,111, the work to extend over a period of ten years. All of this work is to be done upon the water sheds which supply water to the cities and towns of Colorado Springs, Victor, Colorado City, Manitou and Cascade, Colorado.

During the years 1910 to 1912, in-



PANORAMA OF THE PIKE'S PEAK REGION WHERE 10,000 ACRES MUST BE REFORESTED BY ARTIFICIAL MEANS, PIKE NATIONAL FOREST.

clusive, 385 acres were planted with nursery stock and 1,280 acres were sown by various methods, at a cost of over \$17,000. For five years prior to 1910 experimental work in both planting and sowing on numerous areas from a quarter of an acre to several acres in extent was carried on. The experiments were conducted upon all of the various situations present on the watershed. The actual results of many of these plantations were total failures, but whether successful or not they all contributed toward the solution of the problems that must be met in the successful reforestation of this area, and the experience gained in this experimental work has enabled the forest officers in charge to formulate certain principles which puts the reforestation work on this and similar situations upon a definite and practical basis, so that, given a situation, they know by experience the best method to pursue.

There are a great variety of situations represented on the watershed because of the isolated position of the range. The Pike's Peak range, sometimes called the Rampart Range, of which Pike's Peak is the highest elevation, is a short, isolated range of mountains which rises close to the border of the plains. Pike's Peak lies at the northernmost end, and from it the range spreads out wedge-shaped to the south and southeast, sinking rapidly to the foothills where the Arkansas Valley merges with the Great Plains of eastern Colorado. Eastward from the peak lies the broad semi-arid plains, and to the north and west a low mountainous country well wooded with a cover of Western yellow pine and Douglas fir. In each of the latter directions it is 50 miles as a crow flies to the nearest mountains of equal height.

Pike's Peak is the last high barrier in the path of the prevailing westerly winds. In crossing the high Continental Divide these winds are drained of their moisture and are parched and dry when they strike the western slope of the Rampart Range, where they dry out the soil and blow away the fine humus and loam, leaving the surface dry and gravelly. Nearly all of the precipita-

tion is brought by easterly winds bearing moisture from the Gulf. The eastern side of the range therefore receives a much heavier rainfall, and consequently affords better planting conditions. The average annual precipitation for the entire region increases steadily with altitude. At 6,000 feet it is 14.58 inches, and at 14,111 feet it is 29.55 inches. The average annual temperatures decrease with altitude from 47.3° F. at 6,000 feet to 36.3° F. at 10,265 feet, and 19.3° F. at 14,111 feet. Since the three factors of precipitation, temperature, and wind have an important bearing on the reforestation work, they are given careful consideration in choosing the species to be used and the methods to be followed. To this list of important factors should be added a fourth, viz: aspect, since the latter determines very largely the humidity at the surface, the amount of direct insolation of the sun, the depth of snow, etc.

From experience gained through the experimental work and the study of the factors which have influenced the success of the work already done, it is possible to lay down certain definite rules or principles to be followed in this reforestation work. The following points are a brief summary of these principles, which may be considered as more or less general in their application to similar situations, both in the Pike's Peak region and elsewhere.

The highest elevation at which reforestation is attempted is about 10,800 feet. Direct sowing is more apt to be successful at high altitudes than at low ones, because moisture at the surface is quite essential, but the success of seed sowing on any situation, high or low, depends so largely upon climatic conditions, and these vary so greatly in this particular region that the outcome of seeding operations is always uncertain. On all sites, therefore, except perhaps in the most favorable; planting should be given preference over direct seeding. Whether sowing or planting is resorted to, the wind is a serious handicap to reforestation work. It dries out the soil, blows away the fine soil and humus, reduces the humidity of the air and blights the young plants. The western expos-



HEAVY FALL OF SNOW ON MAY 14 WHICH TEMPORARILY STOPPED THE PLANTING WORK.

ures suffer most from drying winds, then follow the southern, eastern, and northern exposures in the order named. The northern and eastern slopes are the most favored, for the precipitation is heavier, the drying winds less severe, they are protected from the direct sun and have greater humidity of the lower strata of the air, besides the protective covering of aspen which these slopes usually bear. Planting therefore is best for the less favored slopes. It is more expensive and much slower than seeding, but the results obtained usually prove it to be the most economical in the end. Planted stock does not require so much protective cover, because the roots extend into the soil to such a depth as to render the plant not entirely dependent upon seasonable precipitation. It is not affected so much by dry surface, and by placing sticks, sods or stones on the windward side of the

plant when it is set, as a shelter to ward off the dry winds, much less loss from wind blight occurs among planted stock than seedlings resulting from direct seeding. The extra cost of placing the shelters amounts to very little since sticks or stones are usually within easy reach of the planter as he sets the plant, and especially in the case of Douglas fir, which is most susceptible to wind blight, the saving in planted stock is well worth the additional expenditure of time.

Direct sowing should be practiced only on the most favorable situations and the work should be done on prepared ground in the fall or broadcasted on the snow in the winter over ground which has been previously dragged or raked.

The following table gives the comparative cost of establishing successful stands by these three methods in the



LABORERS PLANTING WESTERN YELLOW PINE BY DEEP HOLE METHOD IN PIKE'S PEAK REGION, PIKE NATIONAL FOREST.

year 1910. It will be noted that sowing on prepared soil, which consisted mostly of seedspot sowing, cost nearly as much as planting, notwithstanding that all sowing was done on the most favorable sites:

Method	Cost per acre	Per cent of area successful	Cost of restocking failed places	Total cost per acre
Planting.....	\$14.20	100	\$1.04	\$15.24
Sowing (prepared soil).....	7.29	46	6.05	13.34
Broadcasting on snow.....	3.05	77	2.47	5.25

Planting work should be done in the spring and as early in the season as weather conditions permit. In the Pike's Peak region it is usually unwise to plant after May 20.

Since this region is rather dry, the species used are mostly drought resisting. In altitudes of less than 9,300 feet Western yellow pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga taxifolia*) are best adapted. The Western yellow pine endures dry winds and is therefore used on the northwestern, western and southern exposures. Doug-

las fir will not endure dry winds and must be used only on the protected northern and eastern exposures. Above 9,300 feet Douglas fir can be used on warmer aspects because of the better moisture conditions, and the colder situations are planted to Engelmann spruce (*Picea Engelmanni*), Limber pine (*Pinus flexilis*), and Bristlecone pine (*Pinus aristata*). Lodgepole pine (*Pinus contorta*) takes the place of the Western yellow pine above 9,300 feet. Only stock of the best quality should be planted. It costs as much to plant a poor, sickly seedling as it does a vigorous, healthy plant, and since the cost of planting is the heaviest item of cost in reforestation work, it is economy to throw away unfit stock.

The cost of planting operations may vary between certain wide limits, even when strict economy is practiced. The following is a list of the factors which affect the cost of all planting work:

1. Method of planting.
2. Spacing of the plants.
3. Size of stock.
4. Soil.

5. Size of operation.

6. Weather conditions during planting operations.

7. Kind of labor used.

Three methods of planting have been found applicable to the mountainous lands on the Pike National Forest. They are the dibble, deep hole, and cone methods. The following table shows the comparative cost of these three methods when similar stock is used:

Method of planting	Class of stock	Cost per acre
Dibble-----	3—0 Douglas fir	\$ 5.62
Deep hole-----	3—0 " "	7.13
Deep hole-----	2—2 Yellow pine	9.83
Cone-----	2—2 " "	14.20

¹ First figure gives the age of the stock in years from seed; the second gives the number of times transplanted before setting out on permanent site.

The dibble method can be used only with small-sized stock, two or three-year-old seedlings, and in soil that is loose, deep, and easily worked. The deep hole method is the one most commonly employed. It can be used with any class of stock, and since in digging and refilling the holes the soil is thor-

oughly worked, this method is applicable to any kind of soil. The cone method is employed only on very unfavorable locations where especial care must be used in setting the plants. When, in very dry situations with coarse, stony soil, it is desirable to use large stock with a well-developed root system, the cone method is the best because it provides for a great deal of care in adjusting the roots around the cone and gives the plant every opportunity for early rooting.

That the size of operations affects the cost per acre of the work needs no demonstration. In 1911 the cost of planting 67 acres on Pike's Peak was \$11.80 per acre, and in 1912 261 acres were planted at a cost of \$10.04 per acre. The methods used and the stock used both years were similar, and the difference in the cost is largely due to the difference in the size of the job. In fact, a more marked difference would have been attained if weather conditions had been more favorable in 1912.

The biggest problem in economical planting work is that of getting cheap



WIRE SHIPPING CRATES DESIGNED FOR SHIPPING NURSERY STOCK ON THE PIKE NATIONAL FOREST.

and efficient labor. Planting work is always of short duration. For climatic reasons it lasts only for six weeks or two months at best, and it comes at a time of the year when all lines of work are opening up and labor is in great demand. The ordinary laborer is wholly unskilled in the art of planting, and usually does not display a very lively interest in the fine points of the work. It is necessary therefore to have a constant close supervision of the men by a forest officer to insure careful work. An officer can supervise from 25 to 30 workmen after they have become efficient, but for the first two days during the period of instruction fifteen men will keep him very busy. Because of the cost of breaking in men to the work, it is very desirable to keep the same men throughout the season, and so far as possible to secure the same men in successive years, for it is a noteworthy fact wherever the same men are secured on successive years they begin to take an interest in the work, are far more efficient and require much less supervision. In order to eliminate the drifting tramp labor as much as possible it has been found necessary to hire the men with the understanding that no compensation will be allowed any man who does not remain more than three days, and only half pay is allowed if he does not stay one week. In 1912 the men were paid \$1.70 per day with board. They were housed in tents and provided with straw upon which to spread their blankets. Competent camp cooks were employed and the men received substantial board at a Government mess. The cost to the Forest Service of subsistence per man per day was \$0.58, making the total cost per man per eight-hour day \$2.28. The number of higher salaried men required to supervise the work raised the average cost to \$2.48 per man per day. From forty to sixty laborers were employed on the job, the number fluctuating up or down with fair or stormy weather. It is one of the peculiar vagaries of laboring men that, though they may be working very contentedly, let there come a slight interruption and it becomes the signal for general quit-

ting even though they have no prospects of anything better elsewhere. Much difficulty was experienced in this respect during last spring's operations. Periodic storms which precipitated from five to thirty inches of snow occurred up until the latter part of May. During these storms the temperature never dropped to freezing and the snow quickly disappeared. The occurrence of each storm was, however, the occasion for an exodus from camp. This is one of the most serious problems met with in planting work, for it increases the cost very materially, and the man in charge must tax his ingenuity to keep the crew contented.

A few measures which have been successful to some degree to keep the planting crew contented are: (1) provide good food; (2) furnish plenty of straw for bedding; (3) furnish each tent with a camp heater; (4) provide reading matter, current magazines preferred; (5) prohibit gambling and the bringing of liquor into camp; (6) have the cook keep a small stock of chewing and smoking tobacco, socks and canvas gloves for the accommodation of the men; (7) keep a simple shoe-repairing outfit on hand for their use; (8) provide facilities for washing clothes. Some attention to such details has proven well worth while.

The economic value of this reforestation work is a matter well worth consideration. Is the benefit to be derived from these plantations commensurate with the cost of establishing and protecting them? As foresters and conservationists we have always maintained that reforestation work on lands which formerly bore forest and which are not better suited for other purposes is justifiable. However, in the Pike's Peak region the nature of a large part of the treeless areas is so inhospitable that it is a question whether sufficiently high returns could be realized if the stands were established solely for the production of timber. Other economic considerations must therefore enter into the valuation of this reforestation work if we are to show justification for the estimated expenditure of \$80,000 on this planting work.



LABORERS PLANTING DOUGLAS FIR ON NORTHERN EXPOSURES IN THE PIKE'S PEAK REGION, PIKE NATIONAL FOREST.

The primary object in making these plantations is for watershed protection, and the plantations are being made upon the watersheds of Colorado Springs and other adjoining towns. It is impossible at this time to show in actual figures just what value the effect of the establishment of a stand of timber upon these watersheds will have, but since the Forest Service is working on the theory that standing timber has a very beneficial effect on the regulation of stream flow, and observations seem to prove this theory correct, it is reasonable to assert that these plantations will have a great economic value when the value of the water secured from these watersheds is considered. Recent investigations on the subject have shown that at present the water used by the city of Colorado Springs alone for municipal and domestic water supply has an annual value of \$80,000. In addition there is 2,000 horsepower of electric water power developed on this watershed which has an annual value of \$40,000, making a total annual value of the used water \$120,000. In addition there are 40,000 horsepower still undeveloped, which it is estimated will have

an annual value when developed of at least \$100,000. Then add to this the increase in the value of the municipal water supply as the city grows and the demand for water becomes greater. With these figures on the present value of the water resources of one city in mind and the possibility of beneficial influence by a new forest cover in regulating and increasing the flow of these streams and keeping them clear and cool, the expense must be considered reasonable and justifiable.

There is small chance for appraisal of the aesthetic value of stands of timber in such situations, and yet it is by no means negligible. The Pike's Peak region is visited each year by no less than 200,000 people for the purposes of sight-seeing and recreation. It is to the wooded cañons that the pleasure seekers go and not to the open burns, and it is not unusual to hear unfavorable comment from tourists about the great barren, unsightly burns. And so there is no doubt about there being a real aesthetic value to forest planting on Pike's Peak, even if the exact measure of this value in dollars and cents can not be named.

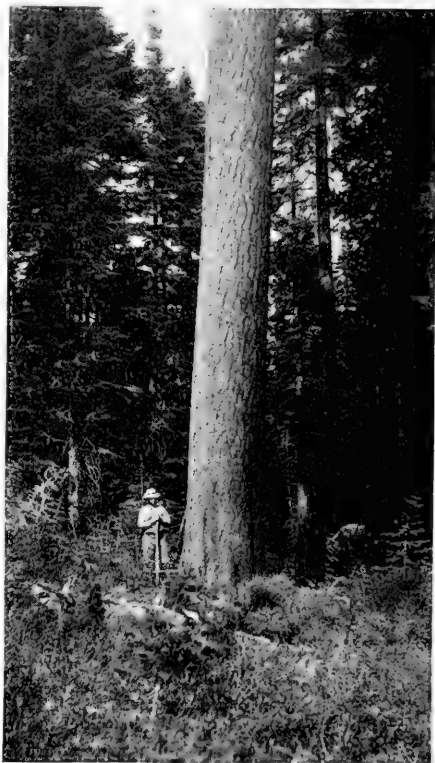
RECONNAISSANCE: ITS RELATION TO FOREST WORKING PLANS

By R. H. BOERKER, *Forest Assistant, Lassen National Forest, California.*

THE present-day timber reconnaissance is the basis for a working plan embracing all the various phases of national forest administration. The old idea that reconnaissance is merely a stock-taking or a preparatory step in timber sale work has given way to the broader notion that reconnaissance is a preliminary step to the better handling of all forest resources. In short, reconnaissance work reveals to those of us who are working with the National Forests what our resources are, where they are, how much they amount to, and what should be done with them. This paper will attempt to show how reconnaissance, as carried on at the present time, fulfills this manifold purpose. For the purposes of this paper the results of reconnaissance may be grouped into two general classes; namely, the direct and the indirect results. The direct results of the work are: The topographic map, the type map, the estimate of the timber, the forest description and other general information. The indirect results are numerous, and will be taken up under the headings: Silviculture, Protection, Grazing, and Policy.

The most important direct result of reconnaissance is undoubtedly the topographic map. It locates things better than they have ever been located before, especially in unsurveyed or poorly surveyed country, shows where the forest may be put to special uses, and locates more definitely improvements and administrative sites. Its most valuable attribute is its permanency; the estimate and the description change slightly, but the configuration of the land remains the same. For the purpose of formulating working plans this map is extremely helpful. As intensive management develops, the need for a complete reconnaissance map of the forest will increase in proportion. Intensive management comes in disguise. Every mile

of trail, or telephone, or railroad that is built in the forest is a step toward more intensive management and a greater need for better maps. The present value of this map lies, therefore, in the more efficient execution of the rough working plans we now have, in the basis which it gives for making sales, and in



BIG SUGAR PINE AND FIRS. LASSEN RECONNAISSANCE, 1911.

the step it furnishes in preparation for the intensive plans of the future.

In general, the type map which is discussed more fully under various other heads serves several purposes. It shows the relative amount and acreage of brushland, grassland, timberland, woodland, barrens in need of a forest cover,



ALPINE TYPE, MT. LASSEN MOUNTAIN HEMLOCK OF LITTLE COMMERCIAL IMPORTANCE.

waste lands such as lava beds, and water areas. It shows the composition of the timberlands; in other words, what species of commercial importance are on each "forty," and also the relations that exist between the distribution of the various species and the factors of topography and altitude. Furthermore, it serves as a basis for applying tables which show the yield of each forest type.

The timber estimate serves a three-fold purpose. It gives us an inventory of our timber resources that is more accurate than any we have had. The estimate supersedes all former guesses, mountain-top estimates, and rough reconnaissance calculations; in itself it is an exact working plan estimate. Comparing this with the best figures we have had heretofore, one gets an idea what reconnaissance estimate means. A rough reconnaissance made in 1910 for certain townships on the Lassen National Forest showed about 316 million feet of timber. An intensive reconnaissance for the same area, made two years later, showed 808 million, or about two and one-half times as much. These figures, based on the stand upon about 80,000 acres, are fairly indicative of

how the total forest estimate would compare.

The second purpose of the reconnaissance estimate naturally follows from the first, for, after knowing how much we have the next question is how much can we sell? In other words, what is the sustained annual yield for the forest? At the present time this cut is figured from the best available data, namely, the "rough" reconnaissance mentioned above. The intensive reconnaissance figures would mean that we had, yearly, about two and one-half times more timber for sale than we did under the old method. While very interesting and important in the future, these figures are not essential at present because we are at the present cutting only a fraction of one per cent of our annual yield, and there is no danger of reaching or exceeding the annual yield for many years. Naturally all methods of regulating the cut depend more or less upon accurate estimates.

The third purpose of reconnaissance estimates, and probably the most important from the standpoint of present value, is that they serve as a basis for making timber sales. Logging propositions to attract purchasers of timber can



RECONNAISSANCE MEN HELP TO DISCOVER AND EXTINGUISH FOREST FIRES.

not be worked up until a reconnaissance of timber areas has been made.

The third direct result is the forest description. This description endeavors to give in words what can not be told on the map, and it is concerned with the present conditions under which the timber is growing. In future it will serve as a basis for making comparisons and determining whether the forest conditions have improved or not. Usually the reverse side of a special form is filled out, which includes, among other headings, amount of immature growth, its distribution and the relative percentages of the three leading species, notes on rock, soil, ground cover, underbrush, condition of timber, average age, logging conditions, and adaptability of the land to logging. The immature growth, that is, sapling and seedlings below 6 inches in diameter at breast height ($4\frac{1}{2}$ feet), is usually designated by some adjective, as "good," "fair," or "poor"; the manner of distribution is noted as "in groups," "singly," "general," or the like. Assuming the total amount of small growth to represent 100 per cent, the percentage of the leading species is given as "yellow pine 80 per cent, white fir 10 per cent, and in-

cense cedar 10 per cent." If the tables of the total stand differ from these, it can be seen whether the yellow pine is increasing or decreasing as compared with the white fir, and in what proportion. This information would help indicate the predominant species in the next crop and would be helpful in marking the timber. It might also lead one to suppose that, if the yellow pine is reproducing itself readily and the white fir is going back, the soil is better adapted for yellow pine, and therefore this species should be favored. Notes on the amount and distribution of the underbrush are taken the same way. In many cases notes on soil, rock, and ground cover can be taken more advantageously for each forest type or sub-type rather than for each forty. The logging conditions should be described on the basis of natural subdivisions such as logging units. Careful attention should be given to whether the forest is even-aged or uneven-aged, and, whatever the condition is, whether it applies to large areas, to small areas, or only to groups. This is an important matter in adopting a method of regulation. The matter of site classes, types and sub-types, and condition of the tim-



TIMBER LINE, ELEVATION 9,000 FEET, MT. LASSEN, SIERRAS, SPECIES MOUNTAIN
HEMLOCK AND WHITE BARKED PINE.

ber, should be noted, since these notes are of importance in all phases of management:

There is also considerable descriptive matter which must be collected independently of organized reconnaissance, but which at the same time is absolutely necessary for a reconnaissance working plan. Such information applies to large economic units, and when once collected for one of these units need only be revised as economic conditions change. Among the most important items are: The climate and geology of the region and their relation to tree and forage growth; the surrounding population and its relation to the broad subject of forest protection; the general logging conditions and how these affect the prices that can be secured for the stumpage; the present population, its demand and who supplies it; the industries of the region in relation to wood-consumption and other matters.

SILVICULTURE.

As has been said before, the most important direct result of the reconnaissance estimates is that they serve as a basis for making timber sales. The tim-

ber sale contracts of the present time call for a statement of the amount of timber involved in the sale, which figure serves as a basis for the amount of bond, the amount of deposit, and the amount of the subsequent payments. The accuracy of this figure is of the utmost importance in the matter of stumpage appraisal and, of course, is of great value to the man buying the timber since with the aid of them he can figure his profits. Up to the present time no better and cheaper way for working up timber sales and logging propositions has been devised.

Besides furnishing the volume of timber by species for both legal and natural subdivisions of land, other valuable data are secured. From the "forty" estimate sheets the average diameter, average number of logs per tree, and number of logs per thousand board feet, the volume of the average tree, the number of trees per acre, the average stand per acre, and other data can easily be figured. With the help of a growth table an idea of the representation of the various age classes can be secured which will give an idea of the possibilities of a second cut. The date on the number



RECONNAISSANCE IS A PREPARATORY STEP TO TIMBER SALES.

of poles per acre also gives a good idea of what the next crop of timber is going to be like. Data on the physical condition of the trees, such as the number of snags, broken-tops, spike-tops, fire-scarred, and insect-killed trees per acre, are of particular value in that they give the purchaser an idea of how much of this stuff he will have to cut on the sale area.

The topographic and type map are of course indispensable to proper silvicultural management. A working plan based on annual yield is not an immediate necessity because, so far, the annual cut is such a small percentage of the annual yield and there is little danger at present of overcutting. What is necessary, though, is a silvicultural working plan which will put the forest into a better silvicultural condition. For this working plan the maps give us detailed information of what we have, and immediately simplify the problem of what should be done with it.

The relation of slope and aspect upon soil and atmospheric moisture and how this relation affects the distribution of the species is shown in a most striking way. Comparing these maps of the east slope of the Sierras with observations

made on the west slope it is shown conclusively that the species range increasingly higher going from west to east.

This information together with the data on the estimate sheets will serve as a basis for determining the silvicultural treatment, the objects of management, the rotations and other matters. In general the mixed fir types will stand a greater cut than the open yellow-pine types. In most of our mountain forests the rotations and objects of management will be directly affected by altitude. Problems of utilization can not be solved until we know what we have, how much there is and where it is. It has been shown that the best use for lodgepole pine is poles and ties and that red fir and white fir make excellent paper. The next question is: Have we big enough bodies of these species to interest large capital?

Reconnaissance locates areas of timber that are badly in need of cutting either because they are deteriorating rapidly, or on account of insect infestation, or for other reasons. This work may also locate areas in need of planting; at least it shows the location of all brush areas, which class of lands furnishes a most important planting



SHEEP LEAVING THE FOREST IN THE FALL ON THE WAY TO WINTER RANGE IN NEVADA.

problem. In cruising Government timber a rough estimate and map of the private timber is often obtained. This estimate is of use to give an idea of what proportion of a given watershed or other unit is privately owned and what is publicly owned. By mapping in the alienated lands a more complete and effective map is secured for the purposes of fire control. Reconnaissance may locate areas especially adapted to free-use purposes. It may help to discover timber trespass or it may show along what section lines timber trespasses are likely to occur when cutting on private lands takes place.

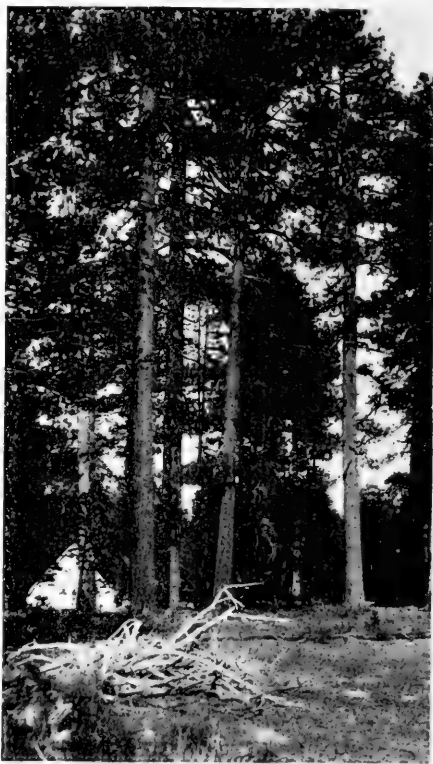
Often silvicultural notes of value are obtained and problems suggested to men doing reconnaissance. It is an excellent opportunity to make observations on seed crops. Even the most casual observer can not help making some observations on the silvicultural characteristics of the different species, and the composition and classification of the forest types. No better opportunity could present itself for a study and observations on the altitudinal distribution of the various species. It is also an excellent opportunity to study type changes; the struggle between the different species in trying to occupy the same sites. Numerous silvicultural problems have suggested themselves to men engaged in reconnaissance. While the information and notes gathered on these problems may be of little technical value, they at least serve as a working basis for future and more detailed studies. Dendrological observations are often made in connection with reconnaissance, and it has happened that new species and new varieties have been found by reconnaissance men.

FOREST PROTECTION.

Probably the most tangible and the most direct result of reconnaissance from the standpoint of fire protection is the fact that the reconnaissance crew, usually of from five to ten men, can be used in case of an emergency as a fire-fighting force. The fundamental idea in locating the crews is of course to put them where there is timber in need of estimating. Whenever there is a choice,

however, they are sent to regions of particular fire hazard. It usually follows that where there is heavy timber worth estimating for future sales, there is also need for protecting this timber on account of its value.

The topographic and type map are of great value in preparing a Forest Protection Plan. The topographical features, such as mountains, ridges, peaks, valleys, and flats are shown, and areas of young growth are located. The loca-



A RECONNAISSANCE CAMP IN BIG YELLOW PINE TIMBER, LASSEN RECONNAISSANCE IN 1911.

tion of water courses, roads, trails, telephone lines, fire lines, railroads, sawmills, and ranches is also of considerable value. Such a map with its timber estimate shows at a glance where the valuable property is and where the areas of greatest fire hazard are. With such data as this to work with, the matter of dividing the forest into protection units, of assigning patrolmen, and of establishing lookouts is simplified con-



SUB-ALPINE TYPE OF JEFFREY PINE AND RED FIR. MT. LASSEN, 10,400 FEET ELEVATION, IN THE DISTANCE.

siderably. The density and age of the stand, the distribution of the age classes, the species, and the topography of the country all materially affect the inflammability of a forest type. The reconnaissance map shows also the old burns that exist. By plotting these burns for the entire forest an idea of the relative fire hazard, based on past experience, is secured and the protective units can be established with this in mind.

A complete map of this kind is of inestimable value to the lookout. When he discovers a fire this map enables him to determine its exact location in regard to topography, timber, type, ownership, whether it is in a bad place or not, and how to get men to it most expeditiously.

A matter of importance, also, is the question of how much timber we are protecting and what is the value of it? Also, how much more money can be put into fire protection? If the 'rough' reconnaissance methods employed in the past show that a forest possesses five billion feet of timber and an intensive reconnaissance of a good portion of the forest shows approximately two and one-half times as much timber, it is very evident that the funds allotted to it

to protect five billion feet were actually spread out to cover two and one-half times that amount.

Protection against insects and fungous diseases is an essential part of efficient forest protection. The greatest loss sustained by insects is in the sustained annual loss of scattered merchantable trees rather than by sudden serious outbreaks. Although only a few trees are killed here and there, the killed timber which accumulates year by year soon mounts to a surprising total. Proper control work can be instituted much more effectively if the centers of infestation have been located by a reconnaissance, either especially for insect control, or in connection with ordinary timber reconnaissance. However, no better opportunity is afforded for the discovery and location of infested areas than by reconnaissance. It has been the practice to tally insect-killed trees separately from those killed by other causes. In ordinary yellow-pine stands this amounts to from 5 to 20 per cent of the merchantable stand. In connection with the regular timber reconnaissance work, the lodgepole infestation on the Lassen was estimated and mapped without any additional cost.

This reconnaissance showed that 35 per cent of the 100 million feet of lodge-pole pine was either dead or dying. Within a year after this estimate was made a sale was consummated and indications are that the infestation will hereafter be short-lived.

GRAZING.

Undoubtedly the most important result of timber reconnaissance from the standpoint of grazing is the topographical map. This map, besides locating such topographical features as roads, trails, streams, bridges, lakes, and reservoirs, also locates such minor features of especial value for grazing administration as old cabins and shacks, old sheep camps, corrals, drift fences, salt licks, water holes, springs, and seeps. The contours on the map immediately suggest grazing districts and grazing units. By consulting this map it would be no difficult matter to divide a given region into individual range allotments which are bounded by natural barriers such as ridges and streams.

The forest type map secured in connection with the topographical map mentioned above may be looked upon as the basis for a general stock-taking of the forage possibilities of a given region. This map shows in colors what areas are covered by timber, by brush, by grassland, and by water. This immediately gives an idea of the relative amounts of grass and herbaceous plants and the amount of browse. In addition to this it gives the areas covered by the various timber types. This is also of considerable value when it is known that certain plants and shrubs occur almost entirely within certain forest

types. For example, rabbit brush and bitter brush, both excellent sheep feed, are found almost entirely in the dry yellow-pine type.

On forests where grazing is of great importance, a detailed grazing reconnaissance is made, differing from timber reconnaissance only in that it secures detailed information on forage rather than on timber. With an inventory of the forage of a region as a basis, the next most important matter is the means for utilizing this crop in the most economic way. Detailed studies, on the areas that need it most, can be instituted concerning the different species of grass and brush, their seeding times and value as feed, etc., etc. Other larger problems remain yet to be solved, and these studies and investigations can be more economically carried on after a reconnaissance has been made of the region in question.

FOREST POLICY.

The Forest Service is in the van of the forestry movement in the United States. It is by all odds the largest corporation which practices forestry. Hence it has a powerful influence in shaping the forest policy of the country as a whole. Whatever the Forest Service does now, the lumberman will do as soon as he can see that it means money in his pocket. Just so with reconnaissance. The lumbermen will soon see that it will be to their advantage to find out what they have, where it is, and what is to be done with it. In other words, they will go about the matter of preparing working plans for their lands just as the Forest Service is doing now.

Thirty different wood preservatives are in commercial use in the United States; many of them utilize creosote of one sort or another; others require chemical salts.

Last year the forest service distributed 116,000 basket willow cuttings: 15,000 to forest schools, 20,000 to agricultural experiment stations, and 81,000 to individuals.

More than 800,000 horsepower has been developed from streams on national forests under government regulation. This represents the output under conditions of lowest streamflow.

Florida buttonwood, a tree confined largely to the keys along the south coast, is very highly prized for use in cooking on ship's galleys. It burns slowly with an even heat and makes but little smoke or ash.

SOME OBSERVATIONS ON THE BLACK FOREST

By F. F. Moon, M. F.,
New York State College of Forestry

PRACTICALLY everyone who has ever read German Fairy Tales as a child must have come under the spell of the Black Forest. The woods were so dark, the streams so limpid, and the whole atmosphere was so charged with the possibility of adventure that to an imaginative child it seemed the most marvelous place in the world—an enchanted realm with no particular location but nevertheless very real.

As we grew older we learned, to our amazement perhaps, that there was such a place as the Black Forest; that it was known in Roman History as the *Silva Marciana*, and really deserved a large part of its renown. At present it ranks as the most popular summer resort in the German Empire and is visited by thousands of tourists each year, attracted by the scenery and the climate.

To an American forester also, the Black Forest has a peculiar attraction

and charm. He, too, is attracted by the aesthetic features and in addition the well kept forests, so carefully managed, appeal to his professional sense.

A word or two of description of this region might not be amiss. The forest is practically a dissected plateau, lying between the Neckar on the north, the Nagold on the east, and the Rhine on the west and south; two-thirds of it lies within the Grand Duchy of Baden and the remainder in the Kingdom of Württemberg. The total area is about 2,100 square miles.

The valleys are quite steep toward the center of the region and while numerous areas may be found where grapes, fruit or field crops are raised, the bulk of the land, especially toward the south is far better suited to the production of timber than to agriculture. The orderly German as usual adapts his crop to the soil and situation and as a consequence we find fertile valleys



Photo by F. F. Moon.

SPLENDID NATURAL REGENERATION OF SPRUCE ON CITY FOREST. ARTIFICIAL REGENERATION USED BUT LITTLE.



Photo by F. F. Moon.

NURSERY OF CITY FOREST OF VILLINGEN IN BLACK FOREST. TRANSPLANTS GROWING UNDER HIGH SHADE. FIVE-YEAR SPRUCE TRANSPLANTS PRODUCED AT A COST OF \$1.38 PER M.

surrounded by fir and spruce-clad slopes. Indeed it is the dark appearance of the fir forests which give the name Schwarzwald to the region.

As can be imagined the lumber industry is of great importance and like our own Adirondacks it is a moot question which constitutes the greater resource, the crop of timber or the annual horde of tourists, both native and foreign. Anyone who has ever toured the Black Forest during a rainy season like last August and has seen the scores of buxom German fraus with "rück-sack" on back, trudging along through rain and mud, will appreciate the charm this region holds for the native. Fashionable watering places can be found like Baden-Baden or Wildbad, but the extreme popularity of the Schwarzwald and its hold on the German of average means is largely due to the efforts of the Schwarzwald Verein. This enthusiastic and patriotic society has spent much time and money in opening up the Black Forest by cutting paths, erecting sign posts, etc., for the benefit of the pedestrian.

The manufacture of clocks, watches and toys is another business of importance in this region.

Traveling north from Switzerland, along the Danube, anything but imposing near its source, the first town one finds of interest to the forester is Villingen, with its justly famous Stadtwald or City Forest.

Villingen is one of the oldest and most famous of the walled towns of Germany, dating back to the 9th Century. At that time it was an important trading post of the Eastern Black Forest region and later became the official residence of the Count of Fürstenberg, while during the Thirty Years War its walls were often besieged. These battered walls and towers are a great attraction to the average tourist, but the City Forest is of greater importance to the visiting forester.

The land now owned and managed as the Communal Forest originally belonged to the "Mark Forest" and is as old as the city itself. It has been under management since the beginning of the 17th Century, and from the standpoint

of size and yield both, is one of the most important city forests in Baden, if not in all Germany. It contains about 9,800 acres and yields about \$5.75 per acre per year net.

In contrast with the forests in Prussia and Hessen, we find that spruce and fir predominate, and instead of the pure stands of Scotch pine, etc., started from seedlings or even seed planted in drills, the forest is reproduced naturally by

species, but they have not been markedly successful, although Douglas fir has received considerable commendation on account of its rapid growth. Thuya, Balsam fir, and Colorado blue spruce have been tried with mediocre results, and white pine, instead of making good growth as it has done near Darmstadt, is ranked as a rather poor tree of inferior technical qualities. Besides it is pursued with almost fatal



Photo by F. F. Moon.

"SCHNEISE" OR COMPARTMENT LINE, CITY FOREST OF VILLINGEN, BADEN, GERMANY. THIS FOREST YIELDS OVER \$5.00 CLEAR PROFIT PER ACRE EACH YEAR.

means of skilful cuttings. Indeed, after watching the results obtained by Forstmeister Neukirch, at Villingen, and noting the splendid stands of the proper species they get naturally out of a complex mixture, the knowledge the average German forester has of the reactions between species, light and moisture, seems almost uncanny. Experiments have been made with American



Photo by F. F. Moon.

OLD TOWER AND CITY WALL OF VILLINGEN, BLACK FOREST, GERMANY, ONE OF THE EARLY TRADING CENTERS OF THE BLACK FOREST. IT IS MENTIONED AS EARLY AS THE 9TH CENTURY. NOW CENTER OF CLOCK-MAKING INDUSTRY.

persistence by the male deer as the German bucks show a pronounced favoritism for this American tree to rub the velvet off their horns, selecting it in preference to any of the native species. As a consequence the bark is rubbed to shreds and the young pine saplings soon die. Successful plantations of



Photo by F. F. Moon.

BRUSH BURNING ON SCLUFFERSCHAFTSWALD, BLACK FOREST. BRUSH IS PILED AND BURNED ON SITES WHERE IT COVERS THE GROUND TOO DENSELY TO PERMIT NATURAL REGENERATION.

white pine can only be made if the area is fenced; a rather expensive operation and one apt to discourage the use of this species.

A certain amount of planting of native species is done where natural regeneration happens to be faulty. The seedlings used in this work are raised on the nursery of the City Forester, and while their methods differ from American nursery practice (they use high shade entirely and believe in limiting the number of seedlings per square foot of nursery bed since it costs less for seed and they maintain that close competition weakens the young plants), the young seedlings and transplants are extremely thrifty looking and the cost astonishingly cheap. (Five-year-old spruce transplants are raised by Forstmeister Neukirch at a cost of \$1.38 per thousand.)

The annual cut of the forest averages about 21,000 cubic meters, about 32 cubic feet per acre per year, which brings a gross revenue of \$76,000 and a net financial yield of \$54,000 which adds considerably to the budget of the

city fathers. It might be said in passing that this record is far surpassed by the financial results obtained on the Communal Forest of the town of Gaulsheim, Baden, a small village in the Black Forest, located next to Forbach in the Murg Valley. This village of 800 inhabitants has owned a communal forest of 2,000 acres for some centuries from which it gets enough revenue to pay the operating expenses of the forest, the running expenses of the village itself and besides declares a yearly dividend of \$4 to each inhabitant.

With the above facts in mind it is not at all surprising that some of our most progressive States have passed laws enabling towns and cities to acquire land to be operated as City Forests. The growth of this idea will mean much toward the spread of forestry and the better use of land. Many a town in the Northeastern States could profit by the example of Villingen and Gaulsheim and get a substantial revenue from adjoining areas now considered waste land; incidentally the appearance of the



Photo by F. F. Moon.

FINAL APPEARANCE OF SELECTION METHOD, SCHLUFFERSCHAFTSWALD FORBACH, BADEN. ALL OF OLD TIMBER REMOVED.

environs would be vastly improved in most cases.

From Villingen, following the regular route we pass through Triberg, a Forstamt of comparatively small importance but noted for possessing, in the Falls of the Gutach, the most superb cataract in western Germany.

From Triberg to Rastatt there is little of interest, but at the latter place we tap the valley of the Murg, celebrated for the superb ship timbers it furnished in times past to the ship builders of the Lower Rhine and Holland.

At Forbach in the Murgthal, conditions were met which were of especial interest on account of the close resemblance they bore to our Adirondacks, countries, of course, excepted. The soil is thin, slopes are steep, rain fall sufficient for purposes of regeneration and the past treatment astonishingly like that of the North Woods.

The original owners cut their timber and floated it down the Murg and via the Rhine to Holland, and on account of the heavy transportation costs and toll charges levied by the various principalities, etc., through which they

passed, only the timber most accessible, and the best of that, was cut. This led to heavy overcutting of the lower slopes followed in some cases by fire and the upper slopes remaining untouched went ahead accumulating forest capital.

From 1840-1860 various portions of the old Schiffferschaftswald were purchased and brought under the management of a stock company of which the Duchy of Baden holds the controlling interest; the forester in charge, is therefore a state official. The part of this amalgamated forest, known as Forbach II containing 12,000 acres is in many respects the most interesting forest, to an American at least, in all Germany. In the first place it is composed chiefly of conifers like the forest of Maine and the Adirondacks; it had been more or less abused in the past by overcutting and some burning; the timber on the upper slopes was over ripe and deteriorating when it was put under the control of the State. Conditions having a very similar sound to those that obtain in some of the Northeastern States.

Their method of attacking the prob-

lem was to apply the fundamental principles of forest management; ripe timber should be cut and the yield should be regulated with regard to the amount of forest capital standing on each unit of area. By extending the road system portions of the forest previously inaccessible were opened up and were able to do their share in furnishing the annual cut.

As one would expect, from the silvicultural and economic conditions found here they have avoided a clear cutting system; the Selection method being used on steep slopes and the Group method on benches and gentle slopes. This is not only gives Forstmeister Stephanie great freedom in locating his cuttings but also keeps the slopes under cover, which prevents erosion and does not offend the eye of any of the many tourists who pass through the valley of the Murg.

The criticisms so often leveled against these systems viz., slow to regenerate, apt to produce inferior timber, expensive, etc., carry little weight with the Forstmeister.

Natural regeneration is all that could be desired, out of the 105 acres regenerated each year, about one-fifth only is reproduced artificially; concerning the quality of the timber, 72 to 80 per cent is "use wood" and as far as the financial side is concerned, the enormous revenue of \$11 per acre per year net, speaks for itself. It is only fair to state, however, that a portion of this phenomenal yield is due to their gradual removal of the surplus of forest capital in the older age classes. (With their rotation of 120 years, periods being 20 years each, one would expect one-sixth of the forest capital in each

age class; instead there is 55 per cent in the oldest age class. They can and should cut more than their growth.)

The road system of this revier is wonderfully complete and well maintained—68 miles of splendid woods roads (which, by the way, compare most favorably with some of our State roads), and 95 miles of slide ways. The woods roads are from 4 to 6 meters in width, limited to a grade of 10 per cent, and cost from \$2 to \$2.50 per running meter. For the extension and maintenance of this system \$4,500 per year is set aside from the forest budget; a large sum to be spent annually on roads from our point of view, but absolutely necessary and economical on a perpetually managed forest.

The interest that this revier has for the American forester is the fact that conditions of climate, site, past treatment, etc., are as similar to those found in the Adirondacks as the two countries will permit (timber higher and labor cheaper in Germany, of course).

Under State direction they have collected a group of holdings previously mismanaged: they have exploited areas previously uncut and carefully regenerated previously overcut areas. They have reforested where necessary to complete the stand; they have extended the road system at a cost equal to one-sixth of the net income and have found it profitable, and as proof of the pudding they are getting more from these steep, rocky acres than many of the so-called agricultural lands in the United States will yield. All of which has been done without impairing the beauty of the Murg Valley, so that it is still a favorite recreation spot with the tourist and health seeker.

There are 703 bighorns or mountain sheep in the national forests of Nevada.

In 26 States there are State foresters who cooperate with private timberland owners in solving forest problems.

The forest service maintains nine experiment stations for studies in reforestation and similar subjects.

A national arboretum is being established in Rock Creek National Park, District of Columbia. Eventually it will contain all American tree species which will thrive there.

FOR AN APPALACHIAN NATIONAL PARK

BY DONALD GILLIS

TO promote the establishment by the United States of a great national park system in the Southern Appalachian mountains The Appalachian Park Association was formed at Asheville, N. C., a short time ago, with Governor Locke Craig of North Carolina as president and George S. Powell as secretary. The conduct of its affairs is entrusted to a board of directors, headquarters being in Asheville.

The scope of the association is not sectional, its list of vice-presidents, not yet completed, including the governors of Alabama, Georgia, Virginia, South Carolina, and Tennessee, and citizens representative of other parts of the country such as Charles Lathrop Pack, of Lakewood, N. J.; E. W. Grove, of St. Louis; Mrs. William Cummings Story, president of the D. A. R.; nor is any suggestion made as to location of a park, although it is assumed that a great mountain park would naturally be where the Appalachians culminate in their highest peaks and where climate and natural beauty would make for the most attractiveness.

The association plans look to converting the most suitable parts of purchases under the Weeks law into parks, thus making them available to the people for recreation, pleasure and health, as well as serving the primary purpose of conserving the water supplies of navigable streams. It is therefore declared in the constitution that "Its principal purposes are to urge the National Forest Reservation Commission to acquire as rapidly as possible under the Weeks law the larger areas proposed or recommended by the Commission and the Forest Service for purchase in the Appalachian mountains, and to ask Congress for such additional legislation as

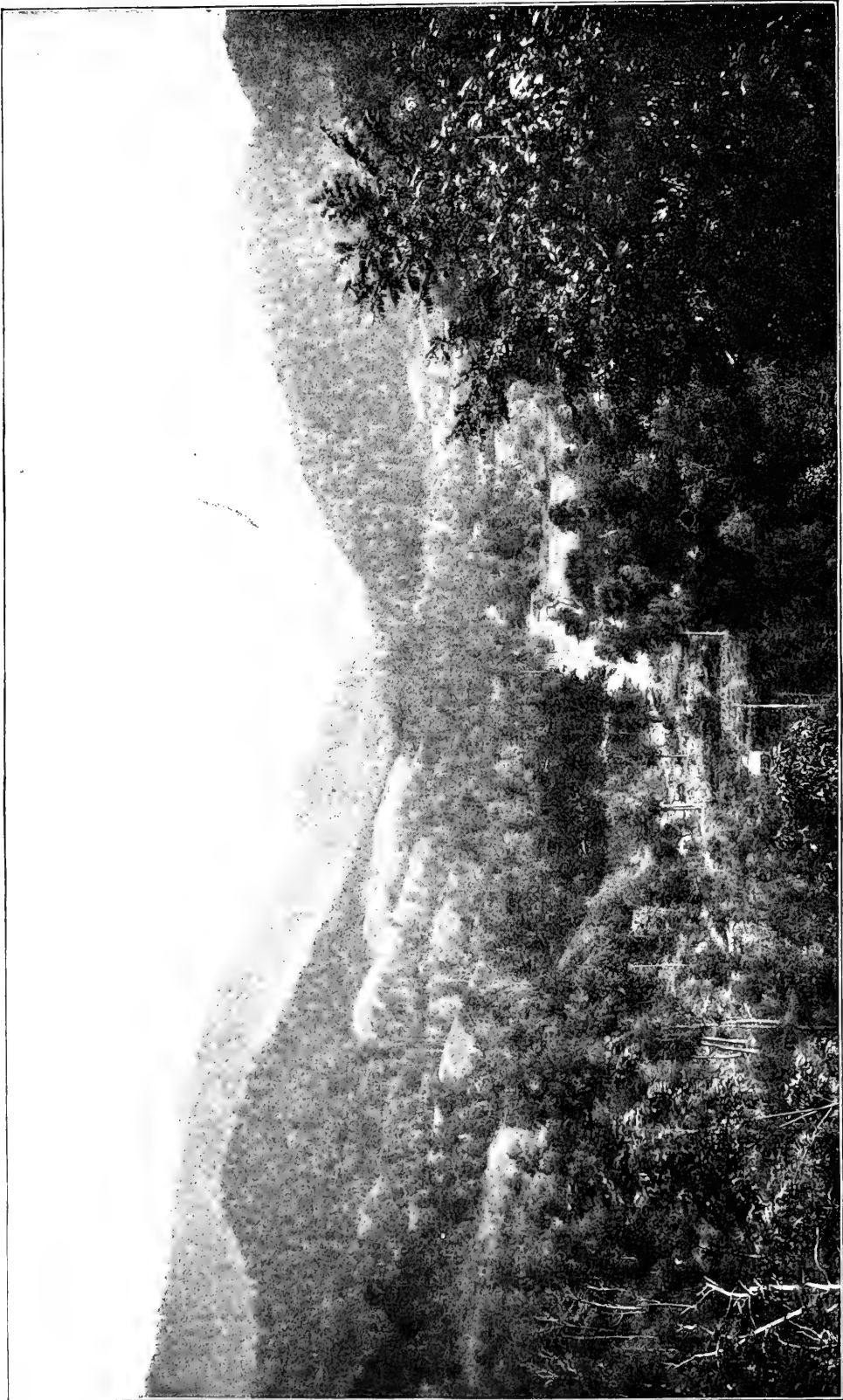
may be necessary to carry out these purposes and to make the most suitable parts of such purchases available to the people for recreation, pleasure, and health."

It is the intention of the association to be an auxiliary to the Reservation Commission and the Forest Service, attaining its aim by supporting these governmental agencies in securing the extensive purchase areas they desire. It will therefore seek to have purchases under the Weeks law concentrated and consolidated and not made in fragmentary units incapable of harmonious development. The organization merely seeks results—to attain them it is entirely willing to efface itself.

The organization believes its purpose and methods of procedure to achieve it are practicable. Certainly the men back of it are practical; they are for the most part men of affairs, familiar with difficulties and the means of overcoming them, but sentimental enough to disinterestedly work for the preservation of this mountain wonderland for posterity. If they day-dream it is that a comprehensive system of national roads through national parks, connecting with radiating State roads, may become a reality in the near and not distant future.

The association seeks to popularize itself and make itself an agency through whom the people will act. To this end its membership dues are placed at ten cents. Most of those who have subscribed to its organization fund have furnished lists of names to the payment of whose dues the subscriptions were applied. The organization has already effectively interested influential agencies favorably to its aims and is working persistently and methodically, if not swiftly.

The gathering and selling of acorns is a new industry, in Arkansas, to supply eastern nursery firms with material for forest planting.



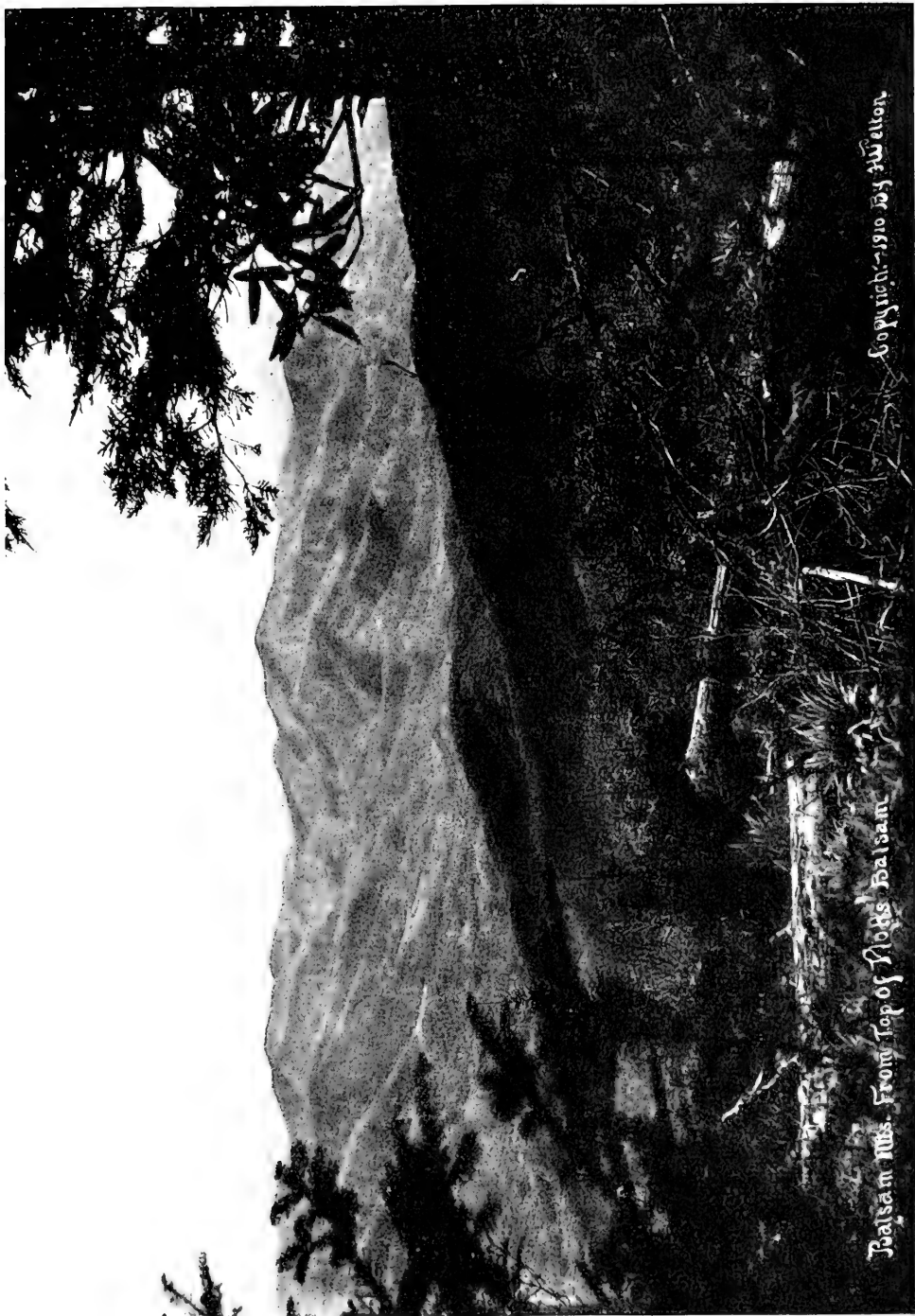
A TYPICAL SCENE IN THE SOUTHERN APPALACHIANS, WELL WOODED HILLS OVERLOOKING A NARROW AND WELL-WATERED VALLEY.



PEARSON'S FALLS, NEAR SALUDA, NORTH CAROLINA. A BEAUTIFUL SPOT IN THE APPALACHIAN REGION.



WHITE PINE FOREST IN THE SOUTHERN APPALACHIAN FOREST RESERVE,
SHOWING REPRODUCTION OF CUT-OVER LANDS. GRAHAM COUNTY, NORTH
CAROLINA.



Balsam Mts. From Top of Notts Balsam

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BALSAM MOUNTAINS FROM TOP OF NOTTS BALSAM, IN THE TERRITORY WHERE MANY PEOPLE WOULD LIKE TO HAVE A
NATIONAL APPALACHIAN PARK ESTABLISHED.



THE SOUTHERN END OF THE APPALACHIANS, NEAR CARTERSVILLE, GA.



A SCENE IN THE SOUTHERN APPALACHIANS SHOWING, IN THE RIGHT FOREGROUND, THE EFFECTS OF EROSION
ON A DENUDED HILLSIDE, WITH WELL-WOODED KNOLLS IN THE BACKGROUND.

FOREST CONSERVATION AND AGRICULTURE

BY THEODORE S. WOOLSEY, JR.

[That there can be no sustained and permanently successful agriculture without forestry; that countries not possessing forests are decadent; that forests exercise a salutary effect on the health of the people; as well as protect the water supply, affect the climate, and prevent damage to crops, are some of the contentions in the following excellent article by Theodore S. Woolsey, Jr. This article was prepared for presentation before the United States Agricultural Commission in London, England. Mr. Woolsey emphasized the fact that he was expressing his personal views and was not speaking officially for the Forest Service.—EDITOR.]

WOULD it be going too far to say there can be no sustained and permanently successful agriculture without forestry? I think not. You will find that those countries which have destroyed their forests and have not adopted a wise policy of forest management, are those countries which today are decadent, and whose agricultural resources have suffered.

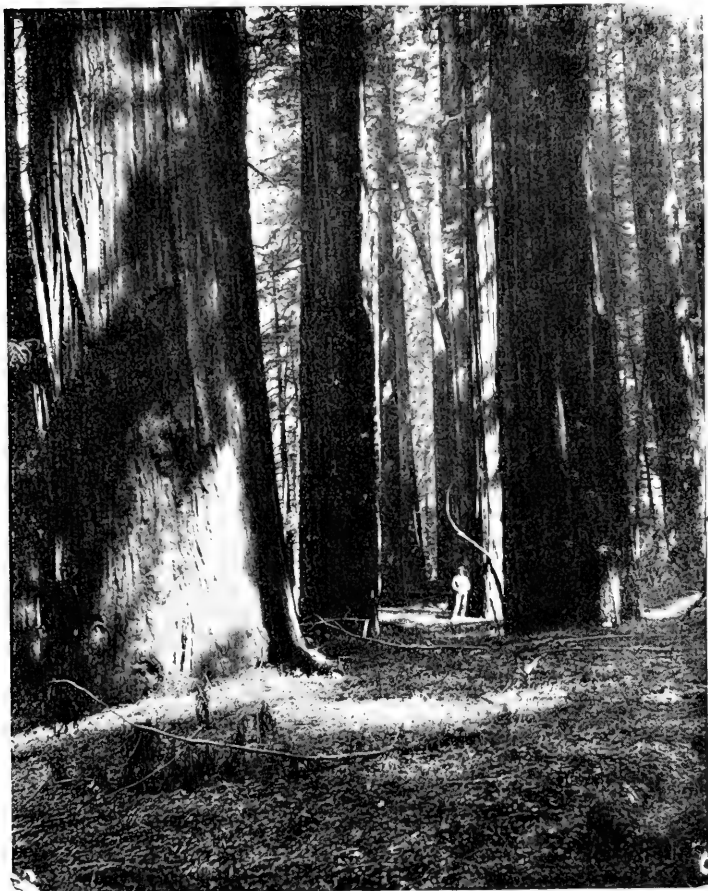
Perhaps M. Clementel, the Minister of Agriculture of France, was a little too pessimistic when, at the recent forest congress, he recalled Colbert's prophecy that, "Not only France, but the entire civilized world, will perish through lack of wood," but it is certain, as I have already emphasized, that every progressive country must practice forestry, and that "deboisement" and decadence go hand in hand. This is not a new idea, since according to Dr. Régnault such men as Leonardo da Vinci, Bernard Palissy, Columbus, Seneca, and Pliny drew attention to the disastrous effects which would follow deforestation. Look at Greece, at Assyria, at Palestine, and Arabia, today; possibly some members of this commission have seen the results of deforestation in the Austrian Karst, in Spain and in certain portions of the French Alps. Moreover it is pretty generally recognized that the influences of a forest go further than merely covering the soil, absorbing rainfall, and protecting mountains from erosion.

How closely is the health of a nation linked with so-called national parks, which furnish breathing-spaces and vacation grounds for men suffocated by

the work of modern competition? A famous Frenchman has stated that "this need of the beautiful is deep-rooted in our very nature," yet forests not only give us pleasure, but in addition exercise a salutary effect in our health. Examine the Landes in France, where formerly the population was fever stricken, and where to-day through the reforestation of maritime pine coupled with drainage, an unhealthy district has been made healthy, and besides yields a handsome revenue. I need not go into details in calling your attention to the beneficial influence of forests on springs, in preventing hail and damage to crops from wind and storms, in favoring precipitation, in controlling avalanches, and in tempering the general climate of a region. The French believe that forests have an unquestionable influence on local climate, although some scientists look for further proof before accepting this theory without reserve. So much for general forest influences.

PROGRESS IN THE UNITED STATES.

The opinion that the United States are backward in forestry is only too widespread. As a matter of fact, if I may be permitted to say so, we have a most efficient Forest Service, organized by Mr. Gifford Pinchot, and now directed by Mr. Henry S. Graves. A number of States have appointed State Foresters, and I see no reason why it cannot be safely predicted, that after the next ten years we shall be at least abreast, and possibly ahead, of other great powers in many lines of forest work. But in order to accomplish what

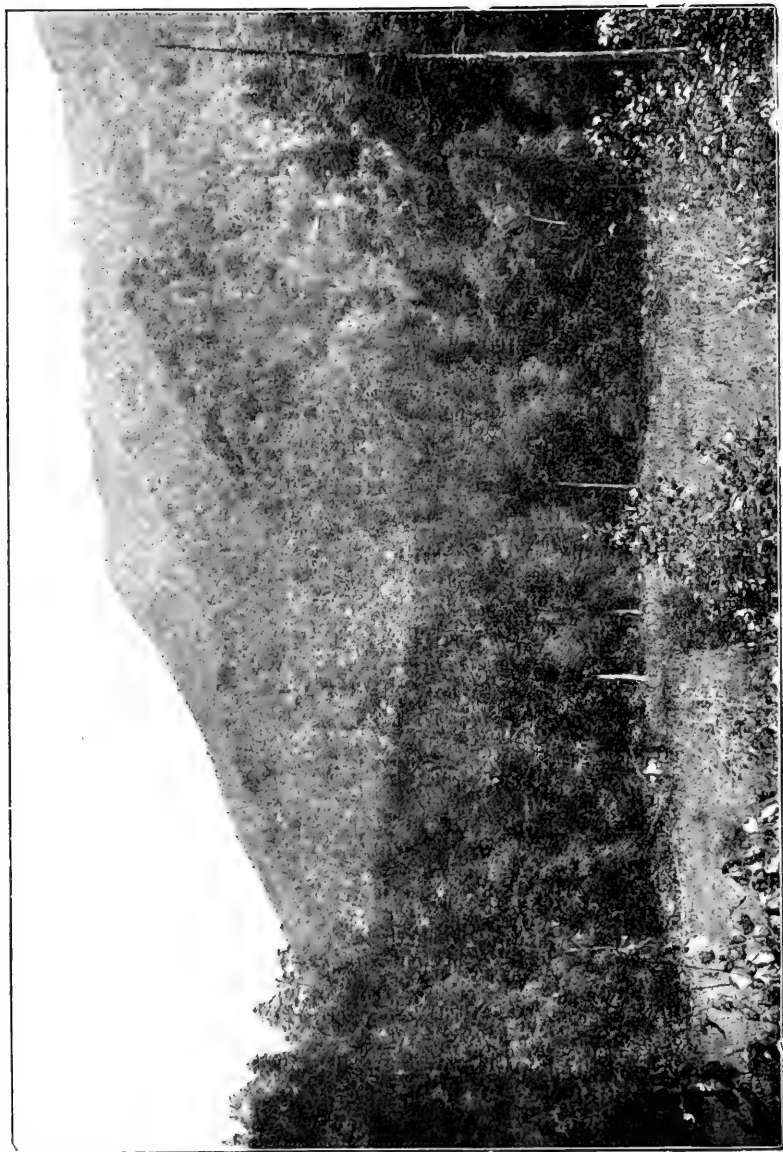


VIRGIN REDWOOD IN CALIFORNIA—THE KIND OF TREES THAT DO NOT GROW IN EUROPE. THESE ARE STRIKINGLY IMPRESSIVE SAMPLES OF THE TREE AT ITS BEST.

we should, it is absolutely essential that private owners realize the disastrous effects of deforestation, and on the other hand be made to appreciate the benefits which may result from cutting their timber on a reasonably conservative basis.

Even today many public men, I am sorry to say, have no clear conception of what forestry comprises. There may be members of this Commission who think that forestry only means preserving trees, or planting waste land. This is too narrow a conception. They should also think of forestry as a business. As a matter of fact, the United States Forest Service today is selling timber on an organized basis, because

it feels that to conserve over-mature trees would mean a loss to the public treasury, and would not be practicing forestry. It realizes that grazing, in many cases, damages forests, but it feels, on account of the importance of the grazing industry in the West, that it is preferable to have regulated grazing, because it is a necessary part of western industrial development. It is opening agricultural land, even if it lies within a national forest, because it sees that development in the West depends upon putting the western land to its highest use. It is protecting forests from fire most successfully, and in this one work alone the Forest Service today fully repays Congress, and the peo-



A TYPICAL FOREST-COVERED MOUNTAIN SIDE. HERE THE TIMBER MAY BE CUT AS A CROP, AND IF THIS CUTTING IS PROPERLY DONE AND THERE IS ADEQUATE PROTECTION FROM FIRE, THE APPEARANCE OF THE MOUNTAIN AND ITS VALUE FOR TIMBER PRODUCTION MAY BE RETAINED.



FOREST IN THE UNITED STATES IN WHICH A FIRE IS RAGING. THIS SHOWS THE HEAVY UNDERGROWTH WHICH FURNISHES READY FUEL TO THE FIRE AND HAMPER THE FIRE-FIGHTERS IN THEIR WORK.

ple of the United States for the annual appropriation; and what is true of the Forest Service applies to many of those States which have organized State services.

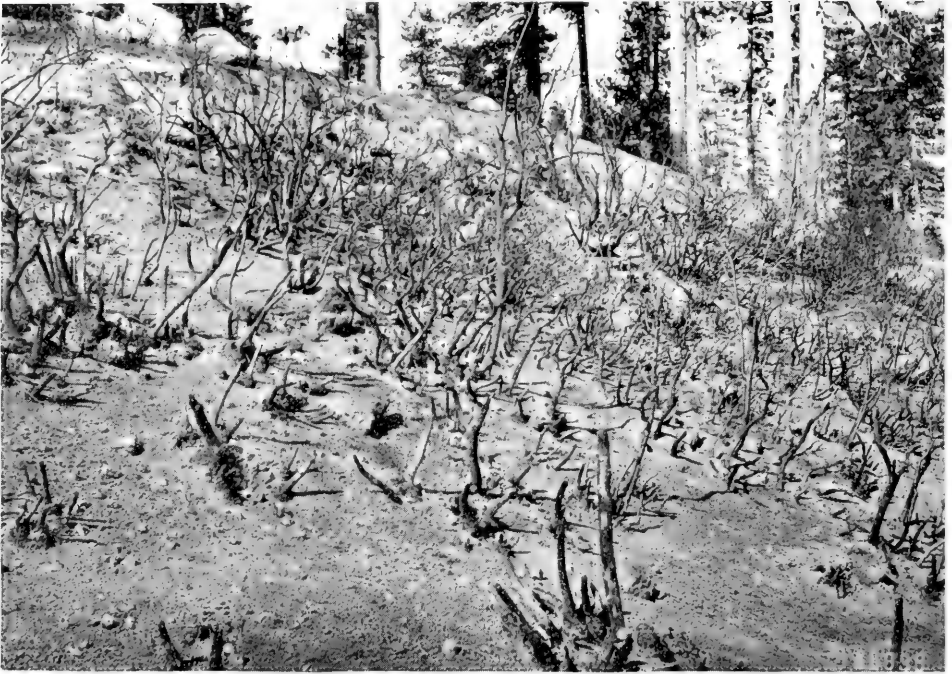
FOREST SOILS.

One of the most important steps which any Government has to take is to decide what land is most valuable for agriculture, and what areas should be retained permanently under forest cover. It is hard to lay down general principles, because not even a financial criterion is a fair basis upon which to decide this question, for the proper decision will vary in different localities; but I am certain that it is an error in public policy to give to the agriculturist those soils which may be cultivated only temporarily, and which, after the humus left by the forest has been exhausted, become waste.

There are examples of this class of

soil in the United States, which have been settled through railway or real estate speculation, and where many of our best type of citizens have been ruined, because they tried to cultivate soil which should have been retained under forest cover. Similarly, such soils as are found in the Jura must without doubt be retained under forest. They now yield a handsome revenue in forests, but if they were to be denuded for agriculture, they would soon become valueless.

On the other hand there are many forest stands in the West of the United States on land covered with timber which must some day be cleared and devoted to agricultural use, partly because the soil yield will be greater from agriculture, but also because many of these timbered valleys are not required for water-shed protection. But whether land is chiefly valuable for agriculture or not cannot be judged solely from



THIS SLOPE WAS FORMERLY WELL WOODED FOREST. IT WAS CUT OVER AND REVERTED TO CHAPARRAL. THE CHAPARRAL WAS LATER BURNED TO SUCH AN EXTENT THAT ITS VALUE AS A WATERSHED COVER HAS BEEN DESTROYED.

the financial results; the industries and welfare of States and communities must be considered where their industries depend upon a sustained stream flow necessary for navigation or manufacture.

FORESTRY PRACTICE.

Granted the general principles of forest influence, this Commission might well enquire, "What does it cost to practice forestry?" I can state at once that to practice forestry on a rational basis costs very little, and in some cases may yield a considerable revenue. I do not go to the extreme of claiming some of the returns which you have seen claimed by foresters, because one cannot help but realize that an oak forest for example which may take two centuries or more to mature, will not yield more than 1 or 2 per cent under certain circumstances; on the other hand, forests of maritime pine, such as you find in the Landes, or forests of silver fir, such as occur in the Jura mountains

of France, may yield a net revenue of from four to eight per cent on the capital invested. This revenue is in addition to indirect benefits.

NATURAL REGENERATION.

But you might go further, and ask, "After you have once secured your forests, how can you regenerate them under present conditions in the United States, where even agricultural laborers are difficult to secure?" The answer is simple. Regenerate your forests naturally, by practicing forestry. The French secure their second crop of maritime pine by merely cutting clear and protecting from fire, and allowing the seedlings to come up naturally. The silver fir in the Jura is cut on what is called the selection system, by the removal of single trees or groups of trees, and the young growth is found everywhere, without the slightest expense for planting or sowing. The beech and oak in France are first opened up to permit the young seed-

ling to start, and then gradually uncovered, until at the first cutting you will find the soil completely covered with regeneration, at little or no cost. These same principles can be applied in the United States.

RESTRICTIVE LEGISLATION.

Since, in some localities, the permanent welfare of the community will depend on conservation cutting, let us consider what steps are being taken to insure this kind of cutting. As yet, there has been no repressive legislation in America to force owners into practicing forestry, and I feel sure this will seldom be necessary, because our citizens are too public-spirited, when once they realize that the development of the locality is at stake, to pursue methods that would ruin the prosperity of others. Yet I wish to call your attention to what France has done in Algeria to prevent the unwise destruction of forests. Article 76 of the famous

Algerian Forest Code, promulgated in 1903, gives in a nutshell the conditions under which private land can be expropriated as a measure of public utility:

1. For the maintenance of lands on mountains or slopes.

2. For protecting the soil against erosion of rivers or torrents.

3. To ensure the existence of springs and water-courses.

4. To render stable the coast dunes and those of the Sahara, and for protection against the erosion of the sea, and drifting of sand.

5. For the defense of territory in the frontier zone.

6. For the sake of public health.

The direct or indirect protection of agricultural soils in Algeria was one of the main justifications for this law.

Such legislation as this, it is hoped, is not going to be necessary in the United States, but it shows what the Republic of France has seen fit to promulgate.



NEW YORK STATE NURSERY AT SALAMANCA. THESE BEDS HAVE SEEDLINGS ONE, TWO AND THREE YEARS OLD AND THESE ARE USED FOR PLANTING STATE LANDS OR ARE SOLD FOR THE REPLANTING OF PRIVATE LANDS.

How can we practice forestry locally many ask? The answer is simple. Consult the State forester, if you have one. If not, write the Forest Service at Washington or employ a reliable consulting forester just as you would consult a doctor, a lawyer, or a civil engineer. Ordinarily a forester must see local conditions before prescribing a remedy.

FOREST MANAGEMENT.

Practical forest-management¹ is applied by the forester in the administration of public or private forests for the same reason that the modern farmer manages his farm under scientific principles, instead of by the hit-or-miss system of a century ago. Any stand ought to yield more with forest management than without it. The application of forest management includes much that the lumberman has overlooked. In the first place, the proper rotation or age when the timber crop reaches maturity is determined not by guess-work, but by considering the amount, size and quality, of merchantable material that can be cut after a given number of years, as well as the demands of the community, business, and market. A clear understanding of the silvics and growth of a species enables the manager or owner to weed or thin his stands at the proper time, and to remove the trees that are retarding the development of the final crop; to secure a succession of crops by the most suitable system of natural reproduction; or if adverse local conditions prevent this achievement, to sow or plant the proper species so as to fully utilize the ground for which it is best suited. Frequently, only the crudest methods can be applied, when, because of poor market conditions, the final crop has but little value; to work a forest intensively at the cost of all direct or indirect profit would not be following the correct management principles. It is apparent that without efficient fire protection, no conservative cutting can be successful; nor should the owner cut conserva-

tively, no matter whether public or private property is at stake, without a clear understanding of the ultimate gain which is to be secured by any sacrifice in today's receipts. The business manager does not change his methods without definite reasons, nor should the owner of a forest. But perhaps the gain cannot be expressed in dollars; it may be protecting the watershed of a navigable stream, safeguarding the water supply of a community, or providing a playground for a commonwealth. Often the forest can be made use of as a breeding-ground for game. Hence it is vitally important that the kind of forest management adopted should conform to the object to be gained.

The cultural rules, method of regeneration, and intensiveness of management, must necessarily depend on the aims of the owner. The State or National Forests must be managed on a broader financial policy than the private owner could afford to adopt. The individual must often put the financial returns first, while the State can well afford to raise the material most needed by the local industries or to maintain the cover, merely interrupted by light selection fellings. Moreover, in the case of important rivers, such as the Mississippi, which rises in the Lake States, and wherever forest lands are important for watershed protection, it may be best (even at a sacrifice in yield) to maintain a heavy cover. The individual must cut his forest crop so as to get the best returns, unless the public demands for its protection that the cover be maintained as a measure of public safety. You have seen that in Europe the policy of restraining the private owner from cutting, when it damages others is clearly established in law.

I hope that I have made it clear that successful agriculture in the long run cannot be attained unless a nation adopts forest management in its broadest sense.

¹ This definition follows what I have written in a manuscript on "The Red Pine in the Lake States."



THE LAST ACCESSIBLE PRIMEVAL PINES IN NEW HAMPSHIRE.

TRYING TO SAVE PRIMEVAL PINES

THE Society for the Protection of New Hampshire Forests is endeavoring to raise \$2,500 to save a grove of twenty-five magnificent primeval pines in New Hampshire. These pines are on the road from North Sutton to Warner. In circulars which the society is sending out it asks that checks be made payable to George T. Cruft, treasurer, and sent to Montgomery Rollins, 6 Hancock avenue, Boston, Mass.

This last accessible grove of primeval

pinces in New Hampshire is located less than a quarter of a mile from the charming village of North Sutton, on the road to Warner. This road is much used between Sunapee and Concord, and traverses a beautiful country.

Twenty-one splendid primeval pine trees are standing. Seven of these form one group close to the roadside. They measure seventy feet from the ground to the first limb. The remaining fourteen, equally large, are mingled in an attractive grove of old hemlocks,

birches and maples, directly across the road. The total height of the pine trees is from one hundred to one hundred and twenty feet.

When Professor Roth, Dean of the Michigan Forest School, visited these trees recently, he said: "They remind one of the big trees in California, and should be saved at any cost." During the twelve years that the Forester of the Society for Protection of Forests has been at work in New Hampshire, he has seen no trees anywhere as fine. They are two hundred and fifty years old, good for another century, and

among the largest white pines that any State has produced.

By careful measurement each of the two largest trees contains three thousand feet, board measure. Everyone familiar with timber knows that a tree containing one thousand feet is unusually large.

The owner will give the land for a reservation, and will sell the hardwood timber at one-half price. He has, however, sold the pines and hemlocks to a lumber dealer. About twenty-five big trees have already been cut off, and it is necessary to move quickly in order to save the remaining twenty-one.

CONSERVATION OF LIFE IN THE LUMBER CAMPS

BY MISS MABEL T. BOARDMAN

THE Red Cross Societies in all countries, though primarily organized to take charge of volunteer aid to the sick and wounded in time of war, have broadened the scope of their work to include the mitigating of suffering after great disasters. To fulfil their duties successfully and efficiently under both of these conditions necessitates the maintenance of a permanent, if skeleton, organization with a trained, skilled and experienced personnel. This means not only an expenditure of considerable funds, but also the creation of departments for special work. Organized and maintained, these departments have proved not only of untold value during war or disaster relief, but have become capable of rendering a constant, patriotic and humane service to the country in its every-day life.

The vital statistics of our country are as yet far from perfect, and no data concerning accidents in the lumber industries could be obtained from the Census Bureau. For this reason we are forced to base our statistics on those obtained from the State of Washington, where 47,400 men are employed in this industry. In twenty-three months' time we find 251 fatal accidents occurred, 990 persons permanently partially disabled, and 8,420 suf-

fered from temporary total disability. To bring this down to monthly averages gives us more than ten killed, forty-three permanently partially disabled, and three hundred and sixty-six temporarily totally disabled in one month.

I note in his address last year, Major E. T. Griggs said that 800,000 are employed in the lumber industry, one-sixteenth of that number being employed in the State of Washington. We have no reason that I know of to assume that lumbering is a more hazardous occupation in that State than in any other. Therefore, I think we are justified in multiplying the above figures by sixteen for one month, then multiplying this by twelve to obtain a rough estimate for accident statistics in the entire lumber industry. This will give us 1,920 killed, 8,256 permanently partially disabled, and 70,272 temporarily totally disabled, annually; or about 5 killed, 22 permanently partially disabled and 182 temporarily totally disabled a day. This is, of course, an estimate based on the Washington statistics, and may not be accurate as to the rest of the country.

Major Griggs, in his address, said: "With an industry affecting throughout the United States over 45,000 sawmills and 800,000 employes, regardless of families dependent on them, you will



AN ILLUSTRATION OF FIRST-AID WORK BY TRAINED CREWS OF MINE WORKERS IN THE NATIONAL MINE SAFETY DEMONSTRATION, HELD AT FORBES FIELD, PITTSBURG, NOV. 1, 1911.

agree with me that we are all vitally interested in workmen's compensation."

If we are vitally interested in compensation laws, should we not be still more vitally interested in the prevention of the need of such compensation; that is, in the instructions for the prevention of accidents and in the practical application of first aid to the injured for the lessening of fatal, serious or prolonged results of accidents when they do occur, interested not only for the sake of 800,000 men employed but for the families dependent on them?

There is almost no labor utilized in the lumber industries that has not some danger involved in it. The sharp edge of the axe or the jagged teeth of the saw in a moment may cause an injury where unchecked hemorrhage will result in death in a brief space of time. Physicians have signed many a death certificate of men who bled to death from slight injuries and whose lives might easily have been saved by some knowledge of first aid. The applica-

tion of cobwebs or some other traditional remedy to an open wound or the use of soiled rags in binding it up often produce an infection with crippling or fatal results.

There is danger to the sawyer from the falling tree, especially when a rotten heart or high wind makes the direction of the fall uncertain; or on steep slopes if the tree shoots suddenly downward, or if a badly strained tree breaks with great force. The handling of the logs at the skidway and the loading onto the trains require skill and agility on the part of the loaders to avoid being caught and crushed by these great pieces of lumber.

The temporary nature of most of the railroads provide their share of accidents, and danger lurks even in their construction, in the blasting of stumps and rocks, and the thawing out of dynamite in the colder camps. Nitroglycerin may be absorbed through the hands, causing severe headaches to the men who use it.

Those who have never seen a lumber camp have yet had vividly impressed upon them by graphic stories the hardships to which the log drivers are exposed, the great personal danger to the river drivers in the excitement of freeing jammed logs, when a single slip may mean the crushing out of life between the heavy logs or drowning in the water below them. Nor does the danger end with the logging, for the saw-mills, with their powerful and sharp-edged machinery, add their quota to the number of yearly accidents.

Recognizing, as we must, the hazards, dangers and accidents in the lumber industry, our desire is naturally aroused to do something in the way of prevention and in extending to the lumbermen the knowledge of first aid.

I note in the Washington law for workmen's compensation, which is a sort of State insurance, the employers of labor paying the premium, that if statistics show an undue number of accidents among the employes of any given company because of poor or careless management, the rate charged that company is increased. It seems to me this law should also be made to work the other way, so that any company making a good showing in the way of fewer accidents than may be taken for the normal number, should have its rates correspondingly reduced. Even if this is not done, the less that has to be paid out in compensation by the State will have a tendency to reduce the general rates paid by the companies.

The Red Cross will gladly cooperate with the Bureau of Forestry and the lumber companies in arranging for first aid instructions. Conditions in lumber camps differ greatly from those in mines, railroads and other industrial plants. There can rarely be physicians resident in such close proximity to lumber camps that their services for instruction can be easily made available. For this reason, it would be advisable to secure the entire time of a certain number of doctors for this purpose. To make an experiment—and we learn best by experience—the Red Cross makes this proposal: Towards a fund

of \$3,000 it will contribute \$500, if a number of lumber companies in a given locality will club together to raise the additional \$2,500, each contributing according to the number of their respective camps and employes. This fund will provide for the salary and expenses of a physician specially trained by the Red Cross for instruction to men engaged in the lumber industry both for the prevention of accidents and first aid to the injured. In connection with logging camps, there should be added certain simple but important instructions in camp sanitation for the benefit of the general health of all the men.

Such a doctor devoting his entire time to this work would travel from camp to camp. In cases of remote camps, he would stay long enough to give the men daily instruction for a short time. In cases where a number of camps could be reached more easily from one place, he would arrange to give one or two lessons a week at each camp. The classes are formed from volunteers who are given practical training. The men soon realize the importance of such knowledge and are anxious to learn. Even those who gather about as spectators pick up not a little useful information. Each camp should be supplied with first aid outfits suitable to the needs of logging accidents, and these the men taught how to use. This is naturally but a tentative plan, with many details to be worked out; but may I commend it to the consideration of those interested in the lumber industry and suggest that they appoint a committee or representative to confer with the first aid department of the Red Cross upon this matter.

Again I am tempted to quote from Major Griggs' able address. He said:

"Logging is a hazardous life at the very best and calls for strong, dare-devil men and men who are willing to take chances. Danger is always present and men become so used to it that they get careless. This, however, is no excuse for needless loss of life and limb."

He commends: "the benefit of co-operative effort in conserving human

life and in protecting the bread-winners, upon whom depend the life and happiness of so large a population."

The American Red Cross offers to do

its share in this cooperation for the conservation of the life of the lumber-jacks in the logging camps throughout our country.

* An address at the Fifth National Conservation Congress.

THE GOVERNMENT FORESTS

The Annual Report of Chief Forester Graves Shows that the Past Year Resulted in the Greatest Progress in the National Forests.

MORE than two billion board feet of timber, with a value of four and one-half million dollars on the stump, was sold by the Forest Service last year, according to the annual report of Henry S. Graves, forester. This is an increase of 167 per cent over the sales of the preceding year. The timber sold was largely for future cutting under contracts that will run for a number of years. The actual cut was a little less than 500 million board feet, an increase of 15 per cent over 1912. Still larger sales are in prospect.

TIMBER SALE METHODS AND PROBLEMS.

The timber-sale policy of the Forest Service is summarized as aiming first of all to prevent losses by fire, and secondly to utilize the ripe timber which can be marketed. Other aims are: to cut so as to insure restocking and forest permanence; to get the full market value for the timber sold; to prevent speculative acquisition and private monopoly of public timber and to maintain competitive conditions in the lumber industry so far as possible; to provide first for the needs of local communities and industries; to open lands of agricultural value to settlement without allowing them to be tied up by timber speculators; and finally, to secure as soon as possible the cost of production and administration to the Government and a revenue to the national forest States, to which go 25 per cent of all receipts.

A large number of national forests already more than pay operating expenses. The revenue from the Alaskan forests now exceeds the cost of administration. The same is true generally in the southwest.

RANGE MANAGEMENT AND RECEIPTS.

The forage resources of the national forests are pointed out as contributing to the maintenance of over 20 million head of livestock, which supply in part at least the demands for meat, hides, or wool of every State in the union. The receipts from grazing, during 1913, though second to those from timber, were more than a million dollars, and showed an increase over the previous year in spite of the fact that the season was less favorable and the area reduced. Over 4 per cent more stock was grazed as the result of increased forage production and improvements in handling stock, especially sheep.

The system of range management employed by the forest service is held to offer hope of relief to the average citizen concerned over the dwindling supply of meat products and their alarming rise in cost. The national forests furnish abundant forage supplies, opportunity for the adoption of the best methods, freedom from livestock diseases, and protection in the enjoyment of all rights and privileges. Cattle from the Hayden national forest in Colorado took the grand championship prize at the National Live Stock Show in Denver, and in many cases the lambs from the forests topped the market. Losses from predatory animals are growing less as the wolves, bears, and other animals are killed off by forest officers.

GAME PROTECTION.

In connection with the grazing work, the forests serve to protect game; and the Wichita forest, with its buffalo herd, is one of the show places of Oklahoma. During the year the service co-

operated with the biological survey in placing over two hundred elk on various national forests. A large number of streams were stocked with trout fry.

CLAIMS ON THE NATIONAL FORESTS.

A large part of the report is devoted to a discussion of various kinds of claims under which title to land within the forests is sought. Nearly a thousand homesteads were taken up under a special act which provides for opening to settlement land suitable for agriculture. The report states, however, that some old homestead claims were instituted for the purpose of securing timber, and the same is still true of some mining claims.

"As attempted frauds under the mining laws are usually resorted to by interests in no way associated with mining, similarly the vast majority of homestead frauds are not chargeable to practical farming; but the appeal to popular prejudice has been made in the name of the mining industry and in the name of the farmers of the country."

MINING CLAIMS.

"The mining laws," Mr. Graves says, "afford the greatest cloak for land frauds in the national forests, and fraudulent mining claims are initiated by men and interests having no connection whatever with the mining industry." The mining laws, for example, have been used to cover townsite and timber claims, to secure farms and ranches, to secure mineral springs, sites for saloons, water-power sites, and stock watering places.

It has often been asserted that the national forests have operated as a bar to legitimate mining development. Figures collected in Colorado during the past year show that, if anything, there is more activity in prospecting on the national forests than outside.

"As with the stock industry, the proper relation of the forest service with the mining industry should be co-operative."

CLASSIFYING LANDS FOR USE.

One of the largest tasks of the service during the past year has been the

classification of lands within the national forests in respect to their highest future use. This work was undertaken during 1913 on a more comprehensive scale than ever before, because there was a specific appropriation for the purpose. Large areas are being classified where the amount of land chiefly valuable for agriculture warrants its being taken out of the forests, and it also takes care of areas on which detailed classification will disclose small areas suitable for agricultural development within the forests. The work is being carried on with the assistance of the bureau of soils and the bureau of plant industry. One result of this work was the elimination of 340,000 acres from the Nebraska national forest, 23,000 acres from the Rainier, in Washington, and 413,770 acres from the Deschutes and Paulina, in Oregon. About 300,000 acres in small isolated tracts were listed for settlement during the year. The areas now being examined for classification have a total area of about 3 million acres.

WATER-POWER DEVELOPMENT.

The development of water power upon the national forests increased rapidly during the year, particularly in California. It is the purpose of the service to encourage power development in every possible way, while safeguarding the interests of the public. The minimum output from the permits now in force is nearly 800 thousand horsepower.

Regulations now in force aim to safeguard the interests of the public, prevent speculative holding of power sites, provide for complete and proper development and continuous operation, secure a return to the Government for the privilege granted, provide a means by which States and municipalities may acquire power permits, and prevent unjust charges being placed on the consumer.

IMPROVEMENTS ON THE FORESTS.

The forests are being made increasingly accessible. More than 350 miles of road, nearly 300 miles of fire lines, nearly 4,000 miles of telephone lines,

and 2,600 miles of trails were built. The present value of all public improvements on the forests is somewhat over \$3,000,000, two-thirds of this amount having been put into lines of communication and protection.

Receipts from all sources for the year were slightly under \$2,500,000, showing an increase of 14 per cent over 1912, while expenditures for administration and protection were slightly over \$4,600,000, showing a decrease from 1912 of 2 per cent. It is pointed out that the work of examining and appraising timber prior to sale is seriously behindhand in some regions and that larger receipts from timber are contingent upon the funds that can be made available for this purpose. Although money for timber-sale work is necessarily subtracted from what is needed to protect the forests against fire, improved organization of the fire-protective system has increased its efficiency. Owing partly to favorable weather conditions the total fire loss was only \$67,000, less than 19 per cent of last year, which was the best to date.

The resident population of the forests is given as nearly 200,000, and the transient population as over 1,500,000. Recreation use of the forests is increasing greatly, and is in some places giving rise to the need for careful sanitary regulation in the interest of the 1,200 cities deriving their water supplies from streams protected by the forests.

MONEY FOR THE STATES.

Under existing law, 25 per cent of the gross receipts from the forests is paid over to the States by the Federal Government for the benefit of county schools and roads. An additional 10 per cent is expended in building roads and trails for the benefit of the public. About \$587,000 will be available for the States during the current year from last year's receipts, besides \$235,000 provided for in the road fund. Altogether, including special funds to Arizona and New Mexico, the national forests provided nearly \$867,000 to be expended for the benefit of the States in which they are situated.

APPALACHIAN FORESTS.

More than 700 thousand acres have been acquired for national forest purposes in the southern Appalachians and White mountains, of which considerably more than half was secured during 1913. These lands are being protected against fire, and the work of the Government has greatly strengthened local sentiment against forest fires. Some 250 miles of trail, to help in fire control, were completed during the year.

CO-OPERATION WITH STATES.

Co-operation with States in protecting forested watersheds from fire has brought about a co-operative field organization in fifteen States and the same arrangement is contemplated with three others.

FORESTRY ADDRESSES FOR STUDENTS

THE address on the Conservation of the Natural Resources of the Nation by Henry Sturgis Drinker, LL.D., president of Lehigh University, and president of the American Forestry Association, published in the December number of AMERICAN FORESTRY, was an address delivered at the Tome Institute, of Port Deposit, Maryland, in October at the invitation of the Institute. Its publication in our December issue should

have been so credited but unfortunately the footnote stating that the address was delivered at Tome was dropped through an error while the article was going through the press. It is a type of forestry address setting forth elementary forestry principles in a way to reach and interest the intelligent young student. Dr. Drinker expects to follow this address with one at Oberlin College, Ohio, before the student body of that Institution on January 16th.

PUBLIC KNOWLEDGE OF FOREST ECONOMICS*

By E. T. ALLEN

Forester for Western Forestry and Conservation Association

DID you ever go into any project requiring your money and effort, together with considerable responsibility, without really understanding it? I suppose every one of us has. Most of us have invested hard-earned money in some enterprise because we couldn't find a single flaw in the argument of the promoter and consequently didn't have strength of mind to resist. We didn't really want to invest, even if it were a good thing. We hadn't the money to spare or, even if we had, we knew some other business better and would feel safer in it. We succumbed to persuasion and logic just because we were off our own ground and couldn't escape decently, but our hearts weren't in it. And however good that project was, it didn't succeed as well as it would have if we had understood it, known it good because we did understand, followed every development with intelligent interest, and put our money and enthusiasm behind it every minute accordingly.

Maybe we never actually distrusted the promoter, but we watched affairs mighty ready to criticise or sell out. We could even fail like martyrs if necessary, but we didn't help as though our own honor and judgment were at stake.

Now that's just what is wrong with forestry in America. We have propagandists with a perfectly irrefutable assertion that forest preservation is a good investment. The public either says "too busy today," and while not denying does nothing, or it says "here's your law (or appropriation or whatever is asked for); now make good and save the forests." But it doesn't know the business factors that govern the enterprise and cannot criticise or

help intelligently. Sometimes the propagandist doesn't know either. And forest preservation, unfortunately, cannot be conducted wholly by a business manager or board of directors. It is a mutual co-operative enterprise, requiring daily participation and ratification by all concerned. There must be an American forest policy which exists, not because a few of us say it should, but because a majority of citizens understand what is needed and why and proceed to put it into effect.

True, we are making rapid progress toward such a situation. Twenty years ago we had practically nothing. Now we have a great and efficient national forestry administration. Most States have some forest laws, some have good ones, a few are fairly liberal with funds. We have forestry associations and congresses. Lumbermen, once regarded as the opposition, are now showing the most rapid advance of all, for in less than ten years their systematic protection of private timber has grown from practically nothing to cover about 100,000,000 acres, with an increase of 3,000 per cent in five years.

But why does the Forest Service still have to fight for existence in every Congress, and at best be supplied with funds much less than private owners spend to protect adjoining lands? Why do many States have no forest legislation and few legislation that is adequate? Why are there sections where lumbermen and public are so mutually suspicious that neither supports any real solution of a mutual problem? Why do we have to have forestry associations and conventions?

Evidently because the average citizen does not know much about the problem himself, in spite of all we have said and done. Result depended upon

human action depends partly upon the extent of desire for this result but more upon the extent of knowledge how to achieve it. We are trying to do as a minority what in its very nature must be an expression of the majority. We tell the average citizen it is his problem, that we have solved it for him, and that he should support the project. We are wrong. *We* cannot solve it or reduce it to a mere supportable project. We can give him the facts, but he must solve it by studying the relation of his conduct and the community's to his own welfare and then acting accordingly. Then, and only then, will Congress, legislatures, lumbermen, foresters and public be able to work together as they must work together, knowing that their policies are sound and commended, that success will be rewarded, and that failure will be punished.

We talk and write a great deal about methods, as though all that is necessary is to make foresters proficient and lumbermen interested. This is all right enough, but what is most needed is permission to apply what we already know. Knowledge and interest are far ahead of opportunity. Success depends chiefly upon having conditions under which they are encouraged. With such conditions you couldn't stop it if you tried.

Let us return to our average citizen who with his fellows constitute the majority of our population. Suppose that in his home town, where community relations are so closely under his eye that they are familiar and clear to him, a single industry employs a large proportion of the population, produces the chief share of all manufactured products, and pays an essential part of the taxes. Let us say it is fruit-growing, or dairying, or furniture making. This citizen would not think twice before conceding its necessity. Anything threatening its discontinuance would be a menace to be fought vigorously; anything promising to increase it would be encouraged. Town officials, chamber of commerce, citizens—all would work and spend in earnest for its continuance and development just as you have seen them do often when occasion of-

fered to promote enterprises of community advantages. No one in public life would dare do otherwise.

Moreover, they would know how. If it were a dairy community its average citizen would know pretty well what production costs, what prices are necessary, what improvements are feasible, what the State can and should do to aid and regulate, what public demands are reasonable and what are unreasonable.

The relation of forest industry to the State or nation is exactly that of our illustrative industry to our suppositious town and so is its relation to every citizen. Lumbering is one of the three or four greatest American industries—it is our greatest manufacturing industry—and forest products are used in almost every other besides being practically life essentials. Certainly it is second in usefulness to none except agriculture, and this would fare ill without its aid in many ways. The only reason the average citizen does not realize this and give it the same active and intelligent interest that he gives home town problems is that he cannot see it so clearly. The very immensity and importance of the industry causes its several processes of growing, manufacturing and distributing to be conducted separately and thus confuses the public mind. Different communities see different parts of the process and get no thorough grasp of forest economics.

In many a little German village the whole community sees the forest grown, cut, manufactured and used. Those who do not actually participate, serve or supply those who do. All use the crop or profit by what is sold elsewhere. There forestry needs no propaganda. The people could not understand the need of it, any more than of propaganda for raising wheat and making bread. Yet their situation is really no different—it is only more concentrated. Here, too, forest industry is an entity. Man needs wood in various forms. To make the earth supply it, employing such labor as is required to make it suitable and available for his use, is a business. Its permanence and service to the community; supplying the consumer, employing labor, using sup-

plies, and paying taxes, requires, like other business, perpetuation of the resource dealt with, economy in every process, and just payment by the consumer for service rendered.

Here is where we, who should be the teachers, are at fault. We talk too much about forests, as though they were an end in themselves. We might just as well talk only of land when trying to improve agricultural conditions, or water when urging the protection and propagation of food fishes. How can the average citizen understand forests? It is the business of producing and making them useful to him that he must understand—its place in the society under which he exists, the economic laws under which it exists. He must be brought to consider all forest production and all forest use as little or no different from the production and use of any other necessary crop, obviously to be encouraged and stabilized on a permanent basis profitable to all concerned. Whether he is a private citizen or a law maker serving private citizens, he must be fairly familiar with the factors which govern lumber prices, logging and manufacturing methods, the cost of growing and protecting the raw material. As long as he thinks an uncut forest is forestry, and that such forestry is good and all lumbering bad, there will be no real progress. Nor will he have lumber to use sometime when he needs it.

We are moving in the right direction slowly. Once propagandists made forestry an abstract problem of public or private conscience. They dwelt on the needs of posterity and urged present sacrifice as a duty. They practically said, "You are partly responsible for lack of forest protection. Forest destruction is bad for somebody's grandchildren. Badness is wicked. Therefore you are wicked. You need a sermon and we'll preach it." Nowadays we realize that abstract ethics do not influence human action as quickly as does fear of immediate personal injury. It does not offend our reforming instinct to add to our preachments of duty more vigorous and skilful appeals to human selfishness. We say "Do you

want to make more money? Then stop the other fellow from destroying dollars you would otherwise share. Forest preservation is a bargain-price insurance policy you can't afford to be without. It's cheap for a short time only. Look over our prospectus and invest."

Now forest preservation is prosperity insurance and insurance is good business. But it is a commodity that must be paid for in money and careful conduct. The new way is better than the old, but our prospectus is still so general it only gets a certain confiding class of customers. It needs to give more information about the business; information that will both convince the critical and make every customer another salesman.

Seek local arguments. If for the Atlantic coast, look up the pay-roll total for all lumbering and woodworking industries in your State and the total selling receipts from their manufactured products. The size of the revenue thus kept at home, but which will leave you if these industries have to move nearer some other sources of raw material, will probably amaze you as much as it will the public. Learn how much your consumers pay annually for all forest products and figure how much they would save if there were no import freight bills. Then learn the rate of growth of your own species and refute the popular belief that it is too slow to enable saving these sums to those now living. Do you know that Massachusetts is today manufacturing its fourth crop of white pine?

Learn your area of waste land, and, with the same definite growth figures to give your statements news value and convincing business accuracy, show what it might be earning the community by producing forest commodities. Calculate the tax revenues your existing forests bring, and that which forests on now waste land would pay, and show the consequent reduction of taxation on other property. On definite premises of area, growth rate, and conservative crop values show the revenue obtainable by the State from forest reserves of its own, balance this against the cost

of such a project, and prove that you could lower all taxation just as they do in Europe. Study the effect of deforestation on stream flow, use specific familiar examples, and convert the injury into dollars and cents. When you get figures in all these calculations, turn them into popular comparisons that are easily grasped.

If you live on the Pacific Coast, forget that white pine grows rapidly in Massachusetts and appeal to local pride by saying that here, undoubtedly, is the nation's woodlot, where climate and rapid-growing species give an advantage over the East which it is a business crime to leave ungrasped. Show that the area denuded by fire and use will produce an equally valuable crop in, say, sixty years, and that leaving this land idle is costing our five coast forest States about thirty million dollars a year. Add to this the loss by fire and show many millions altogether are being thrown away that might be distributed through every channel of industry. The lumber industry now brings about \$140,000,000 a year into the four northwest Pacific States. Show that this is more than they get from wheat, wool, fruit, dairying and fisheries combined. The Pacific Coast had more than half the nation's timber. Show how many billion dollars this will bring in if saved for manufacture. Show the wreck of industries that would follow its sudden destruction and point out that partial destruction means the same thing in proportion.

When a score of American citizens are endangered by an uprising in China or Mexico, no price is too great to pay for their protection. When a few hundred sailors went down in the *Maine* we were aroused to the supremacy of national effort—war. Are the lives of hundreds of men and women who meet fearful death in forest fires through American carelessness any less precious? Their sufferings any less cause for national horror? The neglect of our people to observe the same care with fire in the woods that they exercise at home, the refusal of Congress and legislatures to appropriate adequately for fire prevention, and the

leniency of our courts with fire law violators, all must be due to failure by those of us who are responsible for American education in these matters to impress a true comparison of values on the public mind.

As a nation we are engaged in forestry. Our national forests comprise nearly 200 million acres. Here is a stupendous task, involving the protection of existing supply, reforestation of denuded areas, and disposing of the product so as best to serve the people and to influence conservative management of private forests. To withhold funds necessary to do the work is letting an immensely profitable manufacturing plant lie almost idle, as well as in danger of destruction, to save the cost of fuel and watchmen. To mismanage it would be as bad or worse, for the one-fifth of our timber supply thus under public control cannot but influence profoundly the permanent wise management of the four-fifths under private control upon which we are still more dependent. Clearly all of us—lumberman and consumer alike—have most to gain from stable conditions for the fullest use and perpetuation of all our forest resources, regardless of ownership; from making all true forest land capable of earning such an income from forest production as, without being excessive, will insure its best management and consequent fullest service to community and nation.

And yet who can deny that we are without any accepted clear-cut, dependable, national policy which supports and finances this immense project with competent consideration of both public and private forests and their influence on permanent industrial development? The Forest Service can neither announce nor execute such a policy so long as there is every extreme of variance in the views not only of the States, whose attitude toward their own forests and forest industries has a profound influence, but also in Congress where any executive policy, to be dependable, must find sanction and support. Every Congressional session sees the whole subject debated from a dozen viewpoints, chiefly political, with a

marked lack of statesman-like treatment based on any real knowledge of forest economics. Besides unwillingness to provide adequate protection for the people's property we even hear advocated the turning it over to a dozen State legislatures that are doing still less with their own forest responsibilities. Ignorance or a desire for political effect has even urged immediate sacrificial cutting to break a mythical "lumber trust" when it should be self-evident that private competition is now at its keenest and that the government supply should be husbanded against the time when it may have some real effect on prices to the consumer.

Now all this is by no means chiefly the fault of Senators or Congressmen. There is nothing in it for them, except so far as it can be made to strike a responsive chord in their constituents. With the public half as well informed on the production of the lumber it needs as it is on the getting of its parcels by mail or the price of sugar, there would be an expression on an American forest policy that would leave no statesman uncertain. We cannot blame him if there is no such expression nor can we blame his constituents for not seeing that he gets it. It is because they have not been told the facts in convincing business language.

Come now to our States. Many have done nothing. Few have comprehensive far-seeing policies, covering their own opportunity on State-owned lands and adequate encouragement of good private management through efficient fire protection and just taxation. It is not enough for the reformer to present good laws and recognize bad ones. Why is there little trouble in passing laws for protection and advance of agriculture, horticulture and dairying? Not because these industries are more useful and deserving, but because people understand their governing conditions and see the point of such laws readily. The chief reason they do not so understand forest conditions is that the reformer himself makes forestry a creed and not a business.

In my opinion forestry will never succeed in the United States until it is

so closely allied with lumbering that neither forester, lumberman nor public makes any distinction. This is the case in Europe and everywhere in America that there has been successful progress. So long as the lumberman suspects forestry of being antagonistic, he will not help. So long as he does not help, the forester cannot talk intelligently to the public. After all, the private owner controls most of our forest area. His use of it, our use of it, and the effect of our relations upon our joint use of it, largely determine our forest destinies.

Were foresters in proper touch with the business end of producing forest products they would have the support of all lumbermen and jointly they would have an irresistible argument. Were forest economics understood and forest industry given its proper rating compared with other industries, suspicious lumberman and suspicious public would alike see a common object and make mutual cause to further it. A State with a hundred times more revenue to be expected from lumbering than from wool growing would not appropriate \$500 for forest protection and \$20,000 for coyote scalps. A community that applauds its chamber of commerce for getting a shoe factory and gives it a free building site would not carelessly burn up a forest capable of employing a thousand times as many men and then tax the owner so he cannot afford to hold and protect the land for a new crop. A State that is glad to see its farmers get a good price for wheat, even if it does use some flour, would not rejoice when its sawmills are forced to accept a low price for lumber. A lumberman who prefers to let his trees stand until Americans need them, rather than cut them at a loss for foreign export, would not be accused of conspiring to bleed the consumer any more than would a farmer who decides not to raise potatoes when they don't pay for raising. A country that applauds fruit growers for systematizing to assure reliable grades and intelligent marketing, sends publicly paid experts to help improve their orchards, and exempts them specifically from the Sher-

man law, would not condemn and seek to prosecute forest growers for attempting similar co-operative improvement of a business still more necessary to the community.

In short, the public would prefer to see all forest industry, public and private, on a sound business footing calculated to preserve it and its benefits to the community, and would expect to pay the cost of producing lumber from the tree to the yard plus the same fair profit that the public itself requires from its individual enterprises. And if this is true, the great need today is for teaching the principles of the business from start to finish. Every process, its cost, and its relation to other processes and to the final price of the product, should be common knowledge.

Nothing can be more inconsistent, so long as most of our forests are privately owned, and even the public forests must be manufactured for us privately, than to antagonize the lumberman whose help we must have by continuing such ignorance of his problems that we even treat him as an enemy. On the whole, forest industry probably surpasses any other in smallness of profit. Unusual opportunity has built some large fortunes, but for every one of these are many cases where the public has profited by failure. Nor is stumpage speculation any exception. Times are changed. Taxes, protection and interest are now compounding more rapidly than prices advance. The tendency is toward competitive over-production rather than toward monopolistic holding back of material. Few if any things are sold at so much less than their value as the trees of which lumber are made.

Whatever may have been in the past, when new supplies were easily available, the lumber producer now sees his industry dependent on forest preservation and his interest in this is as keen as ours. If he does not practice forestry it is, as Forester Graves says, for one or more of three reasons: first, the risk of fire; second, burdensome taxation; third, low price of lumber. This situation will not be relieved by threats of compulsion but only by learning what it costs to furnish forest crops and establishing a business-like policy accordingly.

When forest economics are as well understood as the economics of fruit or wheat growing, the suspicion which always confronts mystery will no longer manifest itself in prejudice which works to the consumers disadvantage. The private as well as public lumber producer, as a class, because he is honest and useful as a class, will be accorded the same respect and helpful sympathy as is accorded the farmer or engineer who develops the possibilities of utilizing our country and supplying its people. And he will be quick to respond.

So we always get back to education, the line in which forestry effort is the weakest. The ingenuity of theatrical, railroad, political and advertising agencies is proverbial. Activities of this kind are now regarded as business necessity. They are needed and legitimate nowhere more than in forest propaganda, which has nothing to conceal but everything to teach. Education is a matter of publicity and publicity is a trade. It cannot be practiced intuitively. Foresters and lumbermen must learn this trade.

* An address delivered at the Fifth National Conservation Congress, November 20, 1913.

FORESTRY CONFERENCE AT VANCOUVER

IN describing various movements toward securing better forestry conditions, chiefly of improved protection against forest fires, E. T. Allen, forester of the Western Forestry and Conservation Association, said at its annual meeting held in December at Vancouver, B. C.:

"The National Conservation Congress, a yearly gathering of prominent and influential people which has possibilities of much power, good or bad, has in the past offered us some opportunity but not as much as we wished. This year, through co-operation suggested by us last fall to its officials and the American Forestry Association, it not only gave forest economics a large share of its main program but also provided for a separate sectional meeting on forestry and lumbering which was a tremendous success. Ten expert committees were appointed last spring to bring in reports on forest legislation, taxation, fire methods, utilization and like practical subjects and \$5,000 was contributed by the American Forestry Association to give them publicity. We were invited to direct much of this work. The result was not only to get for the first time a broad practical treatment of all these subjects before the public in a form beyond suspicion of selfish interest, and with western conditions fully considered, but also to cement an alliance with all workers along these lines in the country so as to keep up such co-operation hereafter in short, our association now has national as well as western influence.

Mr. Allen went on to tell of the work of his association by saying: "We have at last arrived at a point where our organization affords absolute fire protection in the normal season. To put it another way, we can practically insure our timber for the normal year at the present price of supporting the organization we have developed. For suc-

cess was by no means due wholly, or even chiefly, to weather conditions. Representative private and official protective agencies throughout the Pacific Northwest States were asked to submit a comparison of this season's hazard with that of other seasons. While there is some local variation in such comparison, the consensus is that while 1913 hazard did not tax 1913 facilities over-hard, this was because facilities were improved. The season itself was of average difficulty. Montana reports it 'as great or greater than usual'; Idaho 'average, excepting the unusually dry seasons of 1905 and 1910.' Washington, 'not as bad as 1902 and 1910, or quite so bad as 1911, but worse than 1912 and averaging with other past years'; Oregon, 'about an average year, taking all together.'"

President A. L. Flewelling, in an incisive address and speaking from the viewpoint of a practical man, said considerable of particular interest to foresters:

"The subject of forestry in the last decade has engrossed the public mind more than any other of the live issues discussed. It has been heralded from the pulpit, the rostrum and through the public press of all civilized countries, and the thought that in time the world would be denuded of its forests and verdure, with all the dire calamities which would logically follow, has been scattered broadcast by impassioned utterance and scarehead articles until the public mind has almost reached a condition of panic. A class of hysterical people have been handling the subject, who never owned any trees or ever looked a payroll in the face—all good people according to their lights, but more often insane than sane in their statement of facts and conclusions of results. They have so wrought upon the public mind that the subject has become chaotic, and it has become nec-

essary for the people who are really interested in the subject as protectors of trees to organize their forces into an intelligent association, consisting of the owners of timber or their representatives, be that ownership private, State or national. These conditions supplied the primal reasons for the birth and growth of this great organization.

"This association, being made up of the bulk of the intelligent, organized effort for the prevention of forest fires in the territory which it covers, has been enabled to draw to itself most of the potent factors necessary to its success by the natural laws of gravitation. We began by placing attractive literature on the subject in all the district schools, thereby educating the children along right lines, and they in turn educated their parents. Now the first smoke that appears is instantly reported to one of our rangers by the first person that discovers it, over some unit of the network of telephone lines which we have constructed through the timbered district, and one or more of the great army of workers jumps on the fire and puts it out. Our rangers report to the country newspapers, and through this medium a live interest in the subject of forest protection is steadily kept in the public mind. The careless camper and logger and the heedless far-

mer is kept reminded of the duty he owes to the public and to the laws of the land regarding the unlicensed fires he sets in carrying on his operations.

"We recognize as a self-evident truth that trees were created for the use of man, and that when a forest becomes ripe it should be cut without waste and used, so that nature can get to work on the new growth and perfect a new forest for future generations. We are not so much concerned in saving timber for generations yet unborn as we are in saving our present crop from useless destruction, harvesting it intelligently and starting the new crop growing and protecting the new growth. Nature will still grow new trees if we keep the fires out and just let her work. Prevent and put out the small fire and you will have no large fires."

Reports on fire conditions in their various districts were made by officials of the various fire-protective organizations of Oregon, Washington, California, Idaho, and Montana, as well as Government officials of the United States and Canada, and there were several addresses on other phases of forestry. There was a most gratifying attendance both from the United States and Canada, and the conference was in every way a splendid success.

THE BLIGHTS OF CONIFEROUS NURSERY STOCK

A NUMBER of different blights, concerning which little has been known, do considerable damage to conifers in nurseries in the United States, according to Bulletin No. 44, Bureau of Plant Industry, U. S. Department of Agriculture. The increasing amount of forest planting and the danger that imported stock will bring in serious tree diseases make it especially important that methods of controlling these blights be found in order to encourage the growing or planting stock in this country.

Sun scorch is the commonest summer trouble among nursery stock. The

roots of the plants affected die before or at the same time as the tops. Death is caused by excessive water loss. It usually occurs when the air is hot and dry and the soil around the roots is dry. The disease is worse on sandy soils in crowded beds and on raised parts of beds. On sandy soils it may kill suddenly and in definite patches. Successful preventive measures that have been tested by the department are watering, shading and avoidance of crowding. In nurseries located on mineral soils the humus content should be increased.

Winterkilling, another disease, causes

the tops of the plants to dry when the soil is frozen so that the plants cannot take up water. The preventive measures most used consist of a light straw mulch on the beds and windbreaks.

The tops of plants affected by the mulch-blight die in winter. This happens while the mulch is still on or occasionally just after it is removed. The roots do not die till sometime after the tops. The immediate cause of death is unknown. The disease may be prevented by avoidance of heavy, close mulches. Spraying with Bordeaux mixture just before the beds are mulched in the fall may also be of value.

There are a number of needle-destroying fungi, some of which are cer-

tain sooner or later to cause damage in the nurseries in the more moist parts of the United States. They have so far done little damage in our nurseries, and have been little studied. Spraying with Bordeaux mixture at the proper time will presumably prevent damage from any of them. The proper times for spraying have not yet been determined. The importation of European stock should be discouraged in order to avoid bringing parasites which have not yet reached this country.

A great deal of blight occurs in red cedar seedlings and transplants. The cause and methods of prevention are unknown. Shading, watering and frequent spraying should be tested.

MANY USES FOR BIRCH

FROM furnishing material for a canoe in which to hunt whales some hundred-odd years ago to supplying New England factories of today with 11,000 cords of wood annually for shoe pegs and shanks is, according to the Department of Agriculture, only part of the services the birch tree has rendered and is rendering the people of America.

Sir Alexander Mackenzie, the department states in a bulletin on the uses of birch, hunted whales in a birch-bark canoe. The animals were found at the mouth of the Mackenzie River. He failed to strike the game, and concluded that it was probably for the best. While the canoes are frail, it is pointed out that the bark of which they are made resists decay longer than any other part of the tree.

It would be difficult to estimate the value of the service of the birch-bark canoe in the discovery, exploration, development, and settlement of the northern part of this continent. From the Arctic Circle to the Great Lakes, and southward, for a century and a half, that light but exceedingly strong and serviceable vessel threaded the lakes and rivers, bearing trade and carrying civilization where no other boat could

go. The French explorers and missionaries made journeys of hundreds of miles in these canoes, often carrying cargoes which would seem beyond the capacity of such frail vessels.

The range of uses to which birch wood is put is surprisingly large. The articles into which it goes range from church pews to kitchen tables, and from organ pipes to newel posts. We may have our first sleep in a birch crib and our last in a birch coffin. The spools on which we get our cotton and silk thread are birch spools, and the lasts on which our shoes are made are likely to be birch lasts. The largest of the spools hold 12,000 yards, the smallest 20 yards. The wood's beauty, strength, and rigidity make it prominent as a material for musical instruments, and the same qualities bring it into extensive use for flooring.

Many people have an idea that shoe pegs have nearly passed out of use, but the amount of birch previously mentioned as made into pegs and shanks yearly in New England seems to disprove this notion. Birch, the department says, is often put on the market in imitation of other woods, and we may open many a door, sit on many a chair, and write on many a desk

which we imagine to be mahogany, but which is really birch stained to resemble the genuine article.

Nine species of birch grow in the United States, but sweet, yellow, paper, and river birch are those most used. About 45,000,000 board feet of the wood finds its way to the market yearly. Paper birch is one of the few Ameri-

can species with a hold on the forest stronger than it had when America was discovered. Large tracts are now covered with this birch where there was little of it a century ago. It comes in after fire, and some tracts it has taken possession of cover hundreds of square miles.

MAPLE IS HOLDING ITS OWN

THOUGH at one time in the early history of the country an average of 6,000 maple trees were destroyed in clearing the ordinary New York or Pennsylvania farm, maple is today one of the most widely used and valuable native hardwoods.

A bulletin on the uses of maple, just issued by the Department of Agriculture, states that the wood finds place in an enormous number of articles in daily use, from rolling pins to pianos and organs. It is one of the best woods for flooring, and is always a favorite material for the floors of roller skating rinks and bowling alleys. It leads all other woods as a material for shoe lasts, the demand for which in Massachusetts alone exceeds 13 million board feet annually.

Sugar maple stands near the top of the list of furniture woods in this country. The so-called "birds-eye" effect, the department explains, is probably due to buds which for some reason can not force their way through the bark, but which remain just beneath it year after year. The young wood is disturbed each succeeding season by the presence of the bud and grows around it in fantastic forms which are exposed when the saw cuts through the abnormal growth.

Maple is one of the chief woods used for agricultural implements and farm machinery, being so employed be-

cause of its strength and hardness. All kinds of wooden ware are made of maple, which holds important rank also in the manufacture of shuttles, spools, and bobbins. It competes with black gum for first place in the manufacture of rollers of many kinds, from those employed in house moving to the less massive ones used on lawn-mowers. Athletic goods, school supplies, brush backs, pulleys, type cases, and crutches are a few of the other articles for which maple is in demand.

Seven species of maple grow in the United States, of which sugar maple, sometimes called hard maple, is the most important. The total cut of maple in the United States annually amounts to about 1,150,000,000 feet. Nearly one-half is produced by Michigan, with Wisconsin, Pennsylvania, New York, and West Virginia following in the order named. Sugar maple, says the department, is in little danger of disappearing from the American forests, for it is a strong, vigorous, aggressive tree, and though not a fast grower is able to hold its own. In Michigan it is not unusual for maple to take possession of land from which pine or hardwoods have been cut clean, and from New England westward through the Lake States and southward to the Ohio and Potomac Rivers few other species are oftener seen in woodlots.

The total amount of land purchased in the eastern States for Federal forests is nearly 800,000 acres. So far the principal work on these areas has involved their protection against forest fires.

NATIONAL ORGANIZATION TO STUDY FOREST INSECT PROBLEM

THE enormous losses due to forest insects have led to the formation of a society for the advancement of forest entomology in America. The members of this society hold that the work of insects has not received the attention which it deserves.

Henry S. Graves, U. S. Forester, the newly elected president of the society, on being asked about the purposes of the organization, said that they were, in general, to call attention to the part which insects play in forest problems. "We have had," he said, "widespread and specific interest in insect pests such as the San Jose scale and the boll weevil, which affect all of us as to what we eat and what we wear. Forest insects through their destruction of timber increase the cost of a necessity which enters quite as much into the daily life of the individual as do the products of the field and orchard. If the importance of the protection of our forest resources from insect depredations is generally recognized, a large part can be prevented or avoided.

"Right now in the national forests the bureau of entomology and the Forest Service are cooperating to stop insect ravages by discovering their beginnings, and stamping them out. A few isolated trees attacked by insects may form the nucleus of a mountainside devastation quite as serious as that from a forest fire. The opportunity for combatting insects, however, is in one respect better than that in the case of a fire, which runs rapidly, because it takes several years for an insect devastation to spread until it becomes of such proportions as that which overspread the yellow pine forests in the Black Hills in 1906. Watchful care on the part of forest officers, lumbermen, and private individuals will make it possible to catch these infestations before they get a good start. By cutting and burning

the trees, or stripping off the bark, the insects can be killed. As in all such cases, an ounce of prevention is worth a pound of cure."

"Who make up the membership of the organization?" was the next question asked of Mr. Graves.

"It is open to anyone interested in the subject," Mr. Graves replied. "It seems to me that the relation of forest insects to forest protection touches almost every one. Of course, we expect that new members shall be recommended by the present membership, which is made up largely of persons who have studied the forest insect problem at first hand. In order, however, that the objects of the society shall be kept foremost, it is required that at least four of the seven officers must be chosen from among professional forest entomologists. It is expected that honorary vice presidents representing Federal, State, and private interests will be elected to promote the objects of the organization in many localities through the country."

"How will these objects be attained?"

"In the first place, the objects of the society are largely educational. As in all questions of large public importance, the main idea is to give the public an opportunity to know just how important they are. In the second place, the society will form a clearing house for information, and its meetings will discuss the most advantageous methods of insect control. Take, for example, the ravages of the gypsy moth and the brown-tail moth in the Northeastern States. If we can bring about a general knowledge of these insects and of the harm they do, and are able to instill into the mind of the individual the necessity for and the proper methods of their control, how much easier it will be to combat them than when the work is confined only to governmental agencies!"

TIMBER ESTIMATING IN THE PACIFIC NORTHWEST

BY H. J. BROWN

TIMBER estimating varies from the rapid, inexpensive preliminary to the detailed, elaborate, costly method of the total tree count. In making a preliminary, one may run once through a 40 by either estimating the trees in a given strip or by generally sizing up the timber. In making a total tree count it is necessary to run through a 40 8 or 12 times, counting the trees on each side of the compass line for a sufficient distance to cover the entire area.

In the wide range from the one-run, preliminary to the total tree count with its 8 or 12 times through a 40, there are any number of systems, limited only by the ingenuity of the estimator, so that when one reads of a new system having been developed it is not to be taken too seriously.

The first estimating on the Pacific Coast was done on a basis of one run through a 40, but as the timber increased in value more care was taken with the estimating until now the basis is a 2, 4 or 8 times run through a 40, at a cost of from 12 cents to \$1.00 per acre.

The most frequent systems used are:

(1) Counting the trees either in strips or in circles and obtaining the total by multiplying the average tree by the number of trees.

(2) Counting the trees either in strips or in circles and treating each tree as a unit to obtain the totals.

(3) Taking a tree here and there as a base and by much criss-crossing of the area between the compass lines seeing the entire acreage. This plan is subject to a great many variations and is used mostly by men of long experience in the woods. It is considered by many largely a matter of intuition. Nevertheless, its accuracy at times is almost startling.

The strip and circle methods are

fundamentally the same, as they are both based on the counting of trees. Some prefer the circle method, as they can count the trees with more accuracy while standing on one spot than while moving and counting them in a strip. This, however, is largely a matter of training. The strip method is the only one used when making an entire tree count. The difference in the method of estimating lies in counting the contrast and then multiplying by an average tree in contrast to estimating each tree and adding for the total.

To obtain the amount in individual trees is also largely a matter of personal choice. There are two general systems:

(1) Certain "rules of thumb" developed by the individual cruiser and which have been found to produce satisfactory results.

(2) The use of the volume table which is based on an ideal tree, thereby making it necessary to have the trees conform to the volume table and not the volume table to the tree. This table is based on diameters running from 12 to 90 inches, or higher, carrying a different number of logs and a varying taper for each diameter class. In other words, adding the contents of the scale of the individual logs to get the contents of the tree.

For example:

	4 logs or 128 foot tree		3 logs or 96 foot tree	
	Taper 32' log	Contents B. M.	Taper 32' log	Contents B. M.
Butt	3"	4,784	3"	3,960
Diameter	4"	4,010	4"	3,458
36"	5"	3,316	5"	2,994
	6"	2,722	6"	2,568

To use this table one must measure down trees for taper and length and use the volume table accordingly. The diameter of standing trees can be determined by the use of a diameter tape.

Whether the estimate is to be based on a 2, 4 or 8 times run through a 40 is optional with the owner or prospective buyer. A 2 times run through a 40 is made at intervals of two tallies or 660 feet, counting trees on either side of the tally line for a distance of $31\frac{1}{2}$ steps or 5 rods and multiplying the amount by 4 for the total. A 4 times run is made at intervals of one tally or 330 feet, doubling the amount for the total.

In an 8 times run tally stakes are set by a survey crew which keeps ahead of the estimators. These stakes are set along the section line and are used to keep the compassman in alignment. The boundary of the 40 (or $1/16$ square-mile lines) can be carried by the estimator and the compassman can carry the lines, and a survey crew is not used except to run the section lines where there is an indistinct survey.

In making a 1, 2 or 4 times run, whether the trees are counted in strips or circles, there is no fundamental difference in the basis of the estimate. The difference lies in using the individual multiple for the number of trees in contrast to estimating the individual trees and adding for the total.

The following diagram is based on an 8 times run through a 40. Estimates are run on the fractional tally lines.

4th tally or $1/16$ line

$3\frac{3}{4}$ tally line
$3\frac{1}{4}$ tally line
3d tally line
$2\frac{3}{4}$ tally line
$2\frac{1}{4}$ tally line
2d tally line
$1\frac{3}{4}$ tally line
$1\frac{1}{4}$ tally line
1st tally line
$\frac{3}{4}$ tally line
$\frac{1}{4}$ tally line

Boundary line of 40.

In making a detailed estimate of a large tract, if a number of crews are employed, some estimating firms have a head estimator check up the work of the other estimators. In such instances

it is well to have a well perfected system under which all the crews can work in order to produce similarity of data and reports. The head estimator is held responsible for the work of all the estimators. As the work is done under one system, it is much easier to prevent errors or adjust any dispute that may arise.

The foregoing shows that timber estimating has developed from a loose individual idea to a closely detailed system. None of the methods evolved are obsolete or untrustworthy, as the method to be used depends upon the circumstances and object of the cruise, as well as upon the individual making the estimate. A buyer thinking of entering a certain belt of timber and wishing to obtain general information as to the kind and character of the timber does not care to spend much money, and so sends an estimator on a preliminary cruise for this information. The estimator may work alone by simply running along section lines and getting a general idea, or he may have a compassman. If his report is satisfactory a more detailed examination is made. Where stumpage is \$3.00 and \$4.00 or higher, the buyer will probably want a detailed tree count.

Bonding houses now require a careful, detailed cruise by well-known estimators in order to offer assurance to their clients as to the exact amount of timber under mortgage.

In connection with the estimating, a complete contour map should be made, based on barometer readings, which will show creeks, roads, trails, etc. It will also show the outlet of the timber and the best location for possible railroads and camps.

The report form on which the final estimate is made is largely a matter of choice. It varies from the simple form with the section divided into 40's—the amount in board feet found on each 40 to be inserted—to the elaborate form giving the number of trees and their amount, the average length, size and amount per tree, and the different percentage of grades found on each 40. These reports are worked up from the

cruiser's field notes, which are copied on forms while in the field. On large tracts the specific report for a 40 or a section is supplemented by a general report covering the tract as a whole and taking up in detail the quality of the timber, the cost of logging and the general desirability of the tract. This general report is of great value and often covers the ground so thoroughly

that the detailed reports are not consulted.

With the increase in the value of timber there is a growing recognition of the fact that timber estimating must be put on a more scientific basis. Up to this time, however, efforts to make it conform to certain prescribed theories have not been entirely successful.

FIRE PROTECTION ON THE OZARK NATIONAL FOREST

BY FRANCIS KIEFER, *Forest Supervisor*

UNDER this same title there appeared an article in the August, 1912, number of AMERICAN FORESTRY, a description of the fire protection system installed on the Ozark National Forest. It is the purpose of this short paper to briefly discuss its results.

To summarize the scheme, the forest supplied with ten towers, is divided into six ranger's districts, which are in turn subdivided into fire-fighting units in accordance with natural and artificial features such as ridges, streams and roads. In each unit a reliable settler is chosen who is well situated for quickly reaching any fire which may be reported to him either by the ranger or tower lookout. This fire-fighter is supplied with fire rakes, sprinkling buckets and wooden brooms, required for extinguishing. In this way the regular force, which on account of limited appropriations is kept small, is supplemented in time of danger.

After a year's trial, the system has shown its value to be in the ability of the district rangers to (1) place fire-fighters at a fire in its incipency, (2) to relieve themselves of attending every small fire, thus saving themselves for the more critical situations. In the Ozark region fires are numerous, due to incendiarism growing from an old custom of the settlers to burn annually to "improve the range," "destroy varments," "improve health conditions," and kindred superstitious reasons.

The direct benefit of the first feature of value in the system is that the acreage burned over annually is largely reduced although the number of fires has not been diminished. This is shown by the following extracts from annual reports:

Year	Number of Fires*	Acreage Burned	Remarks
1911	145	87,723	Without tower system
1912	241	43,933	With

*Presumably the number of fires is greater in 1912 than in 1911, because all fires were discovered and reported, while in 1911 under the riding patrol system some fires were not discovered.

The one great fault of the system has proven itself to be the difficulty to procure a reliable fire-fighter for each fire-fighting unit. This weakness, however, is expected to be remedied in 1913 through a chief fire-fighter whose sole duty it will be to maintain a strict vigilance in troublesome units.

The speedy action which is obtained by the towers in locating fires and sending men to them is shown by the following:

Name of Fire	Time Discovered	Distance of Fire from Tower	Time Fire-fighters Arrived at Fire
Sylamore No. 80	11:30 a. m.	10 miles	12:15 p. m.
Blue Mt. No.	1:00 p. m.	9 "	2:20 p. m.
Pleasant Hill No. 5	1:00 p. m.	8 "	2:30 p. m.

While setting forth the foregoing results of the protective system it is op-

portune to mention the findings in experiments with various forms of fire-fighting equipment. The abundance of water in the many running streams of the Ozarks has stimulated efforts to devise means for its conveyance to fires. Since packing is unknown on the forest animals, metal tanks were soon abandoned. Collapsible canvas bags designed to be thrown over ordinary Texas saddles and to be carried on a and impracticable through lack of pack man's shoulders have been the object of development. Where water is plentiful there is no question as to the feasibility of conveying it in sufficient quantities on horseback to be of immense benefit in combating fires, but the difficulty which has not been overcome is the prevention of leakage at seams and through the fabric itself. Various weights of canvas, combination of weights, water-proofing liquids, and methods of construction have all failed. It is essential that leakage be prevented because during cold weather both man and beast must be dry. The South African water bag, which has proven its merit in the Forest Service, is unsuited to the purpose since its object is to allow slow evaporation of its contents for cooling purposes as in the case of the earthen Mexican water bottle. The only solution is a rubber bag

but the price is prohibitive as shown by the following quotations from a large manufactory of rubber goods.

Large double horse pack bags, \$30.00 to \$40.00 per pair.

Small shoulder pack bags, \$15.00 to \$20.00 each.

The method of the application of water, however, has been solved for extinguishing burning logs, stumps, etc., safeguarding back fire line when within easy reach of a water supply. For this purpose the standard Forest Service canvas water bucket has been modified by the attachment of a canvas hood across three-fourths of the top with perforated crescent-shaped metal plates at the joint edge. With this contrivance, which is light and can be carried in great numbers to a fire, water can be readily applied as with a garden sprinkling can.

In making a fire line in hardwood leaves two implements have proven their worth, the ordinary so-called five-tined potato digger, hook or rake, which is a standard agricultural tool, and the wood broom, a specially constructed device made from second growth hickory or white oak. The broom is formed by splitting the lower end of the handle and spreading the splits fanwise by means of wooden bars and light wire to hold them.

ELK FROM YELLOWSTONE PARK

ALMOST 2,000 more people visited the Yellowstone Park in 1913 than during the season of 1912, according to the report of the Superintendent, recently made to Secretary Lane. The tourist travel has increased 45 per cent since 1906, and was heavier in 1913 than ever before with the exception of 1909, when the Lewis and Clarke Exposition was held in Portland.

"The winter conditions for wild game were again excellent," says the Superintendent. "With plenty of grass, and the snow remaining soft so they could paw through it to get food, the elk, deer, antelope and mountain sheep wintered well and with but little loss."

"During December, January, February, and March, 538 elk were captured in the park near the northern entrance and shipped for stocking public parks and ranges as follows: 80 to Kings County, Wash.; 50 to Yakima County, Wash.; 40 to Garfield County, Wash.; 50 to Shasta County, Cal.; 50 to Pennsylvania for Clinton and Clearfield counties; 50 to West Virginia; 80 to Arizona; 25 to Hot Springs, Va.; 3 to City Park, Aberdeen, S. Dak.; 4 to the City Park at Boston, Mass.; 6 to the City Park at Spokane, Wash. One hundred were captured and shipped under direction of the Department of Agriculture, of which 25 went to Sundance, Wyo.; 25 to Estes Park, Colo.;

25 to Walla Walla, Wash.; and 25 to points in Utah. The cost of capture and loading on board the cars at Gardiner was \$5 per head, which was paid

by the States and parks receiving the elk. The loss in capturing and up to the time of delivery at their destination was but 22 animals out of 538 shipped."

FOREST NOTES

In spite of the fact that New York leads all the other States in the amount of its State Forests and has done more planting of idle land than any other State, New York as a whole is decidedly apathetic along Forestry lines, especially in the matter of the proper use of its forest resources. The State College of Forestry feels that the only way of improving the situation is to carry through an aggressive campaign of education along forestry lines beginning with the children of the State. The question of how to educate the child along forestry lines is a bit perplexing in view of the complexity of the curriculum in grammar grades and high schools. Too often schools are burdened with too many courses or have all too little time to teach work outlined for present courses. The College of Forestry by no means urges the insertion of a separate course in Forestry. It does believe, however, that the children of the State can be thoroughly acquainted with the importance of Forestry, its place in our economic life and its possibilities as a State and National industry by simply injecting the Forestry point of

view into the various courses given in the lower grades.

At the recent meeting of the Pocono Protective Fire Association of Monroe County, Pennsylvania, the keynote of the report of the board of directors was the need for a widespread education of the people of the community. The directors realize that effective work in keeping down forest fires depends much more upon the active interest of the resident population than upon the contributions of a few owners of extensive tracts of woodland. So a movement is now under way to instruct the residents of the Pocono region as to the need and value of taking care of the woods, and in this manner to extend the limits of the activity of the association by taking as many persons as possible into membership, without regard to the holding of forest lands. The use of posters, the circulation of tracts, and newspaper articles are expected to influence gradually the adult population, while the school children are being taught the lesson of forest conservation through a systematic course of instruction, under the hearty co-operation of the County Superintendent.

STATE NEWS

Maine

The Forest Fire Protective System of Maine, which was among the first established, has been greatly improved the past season by the addition of fifteen new lookout stations. This brings the number of stations up to forty-three, and Forest Commissioner Blaine S. Viles plans to erect six or more new stations the coming year. The fire loss on the wild lands of the State for the past season amounted to only \$29,212.00. As this area includes nearly ten million acres of forests, with an estimated value of from seventy-five to one hundred million dollars, it

will be seen that this loss is comparatively nothing.

While the season was not a particularly dry one, except for short periods of drought, there were no heavy rains, and a great many fires started which would have caused heavy damage had they not been promptly extinguished.

The Lookout Stations reported three hundred and sixty-five fires during the season, and patrolmen seventy-one.

While it is realized that there may be a year of such extreme drought that even the most advanced measures may fail to protect

the forests from fire, the people of the State feel that the system now established is of great value.

A large number of tools, etc., for fighting fire have been distributed the past season and about seventy miles of additional telephone lines constructed.

North Carolina

The great interest North Carolinians feel in securing the wisest use and most efficient control of all our natural resources, whether the property of the individual, of the State, or of the Nation, was shown by the large and representative delegation which attended the National Conservation Congress recently held in Washington.

At the first meeting of the State delegation, called for the purpose of selecting officers, Mr. Z. W. Whitehead, of Wilmington, was elected State Vice-President, and Mr. J. S. Holmes, of Chapel Hill, State Secretary for the ensuing year, while Col. W. A. Blair, of Winston-Salem, was elected a member of the Resolutions Committee.

Of the seventeen delegates present at the Congress four had been appointed by Governor Craig to represent the State, four represented the North Carolina Forestry Association; the University of North Carolina, the State Department of Agriculture, and the National Lumber Manufacturers Association each sent one delegate, while the remainder represented their own home towns. The variety of interests represented is seen in the fact that six delegates were lumbermen or timber users, five were teachers or scientists, two were bankers, two were large land-owners, and one was a prominent club woman.

The unanimous attitude of the delegation was expressed in the following resolution, adopted at their first meeting:

"Resolved, That it is the sense of the North Carolina delegation and they hereby request their representative on the Resolutions Committee to vote for strong Government co-operation in the matter of conservation, believing that it is only through the Government that certain conservation policies can be successfully carried out."

The newly-elected Vice-President, Mr. Whitehead, in speaking of the Congress a few days later, at the monthly meeting of the North Carolina Pine Association at Norfolk, said that "nation-wide benefits would result not only to forestry and timber, but our water-power sites and other national resources would be conserved and advanced as well as protected and safeguarded." He gave it as his opinion that this institution, *i. e.*, the National Conservation Congress, "should be heartily supported and that the lumber people shall take an active interest in shaping its policies in the future."

The North Carolina delegation in all test votes, at which times there were always from nine to eleven delegates present, went definitely on record as favoring strong govern-

ment control of water powers, and only one vote was cast against endorsing the advanced and patriotic stand of Mr. Pinchot on this subject.

The tone of the State press, in commenting on the Conservation Congress, thoroughly endorses its action; while the lumber journals throughout the country are unanimous in praise of the congress, its stand and accomplishments.

New York

The regular session of the New York State legislature has passed a concurrent resolution amending the Forest Preserve section of the constitution. The present provision prohibits any direct use of this enormous area. The proposed change will permit the removal of mature, dead or fallen timber, or permit thinning; authorizes the leasing of camp sites; the construction of necessary roads and trails; also the sale of isolated parcels of land without the Adirondack and Catskill Parks. This provision will necessarily have to be adopted by a subsequent legislature and submitted to a vote of the people before it is active.

Governor Glynn has already stated that he is very much interested in an extension of reforestation, better forest-fire protection, and the purchase of additional lands for Forest Preserve purposes.

Massachusetts

At the annual meeting of the Massachusetts Forestry Association there was discussed the advisability of obtaining State Forests in Massachusetts, and a bill will be presented to the legislature this year asking for \$50,000 a year for five years, with which to purchase wild and waste land in Massachusetts. It is believed by the Association that this will be the means of bringing into the productive list much of the now worthless land in the State which is yielding nothing for the owner or for the State through taxation.

Several important addresses on State Forests as applied to Massachusetts were given. Prof. W. D. Clark, of Amherst, talked on "State Forests in Massachusetts as a Business Proposition." Philip T. Coolidge, in his address on "State Forests in the United States," gave very interesting data concerning the lands owned and held in the various States as State Forests. William P. Wharton talked on "State Forests as Bird Sanctuaries," giving specific examples from Germany. State Forester F. W. Rane summarized the work of his department to date, showing what had been done toward procuring State-owned forest lands. The meeting has aroused considerable enthusiasm on State Forests, and we believe that it will have direct bearing on the passage of the bill which is to be presented to the incoming legislature.

The present status of the White Mountain

National Forest was discussed at length, and it was shown that perhaps through some misunderstanding on the part of the National Forest Reservation Commission regarding public sentiment in New England in connection with the management of this forest, that reasonable progress in the purchase of those lands has not been made. In order to dispel any such misunderstanding, this Association placed itself on record as favoring the management of the forests in the White Mountains along the same lines as other national forests.

The outlook of the Association for the coming year is brighter than ever before. The Association now has twenty-four branch associations and a membership of 3,400, having increased its membership the past year by 1,491. An average of six foresters have been kept in the field giving advice and doing practical work for the past year, and this work will be continued.

From the standpoint of legislation the Association is proud of one bill which passed the legislature through its efforts this year. The Public Domain Act was so revised as to give towns and cities in the Commonwealth the right to own and manage municipal forests, and already some of our towns are taking advantage of this measure. It is hoped that in the near future many other towns and cities will be persuaded to acquire lands under this law.

Pennsylvania

The Central Pennsylvania Forest Fire Protective Association, of which J. M. Hoffman was the organizer and is the forester, has just finished its first year's work. Natural regeneration on the 350,000 acres that now comprises the area of the association's work, in spite of recurring fires, is now at least 60 per cent perfect.

Lands which to the casual and experienced observer seem to have nothing growing on them except brush or worthless trees, one finds on close examination to be growing maple, chestnut, red and white oak, and others of the most valuable tree species. The only great hazard preventing these young trees from becoming valuable timber is fires.

For the protection of the seven million acres of the State land particularly subject to the fire hazard, and about seven million additional acres of land in farmer's wood lots or in communities more thickly settled where the damage done by fires is less, the greatest amount of money ever spent by the State was \$50,000 for two years work.

Mr. Hoffman says in his report:—This money until our work begun had been spent only in actual fire fighting. Last spring and again this fall we were able to induce the Commissioner of Forestry to allow us 24 patrolmen at \$25.00 per month for two months' service. There is this provision for patrol in our Fire Warden act but until our activities began this was never made operative by the Forestry Department.

I held several meetings with land owners and organized an association, each land owner pledging himself to pay an assessment on an average basis. My plans were thus laid to secure the aid from the Federal Government provided for through the Weeks' law. It must be remembered that with the exception of one other association in Monroe County, whose activities cover about 60,000 acres, our work is the only systematic effort made at Forest fire protection on private lands in our State.

I am omitting in this statement the very worthy effort made by several co-operations and individuals for the protection of their own lands which is very difficult, indeed, when all owners of consecutive areas of land do not join for their mutual protection. I am not including in this discussion the 900,000 acres of land owned by the State, except to remark that in many cases where the State lands adjoin or are surrounded by private holdings the protection of both private and State lands is necessary to protect either. Organized forest fire protective associations adjoining State lands will greatly aid the State Forestry Department in protective work.

Our actual work of prevention consists briefly of looking after the railroad right away, cleaning up and burning where there is material that is a fire trap. Burning around saw-mills, utilize the telephone connections in our communities, in securing aid when fire does occur. Organizing fire fighting crews, warning those that were permitting anything that might cause a fire. Many different devices of prevention can be worked out that are unique to each community. Much good has been accomplished by causing the owners of small farms in the mountains to realize that those owning the large holdings that surround their farms are taking an interest in the protection of their own lands.

In this way we can assure men pay if they fight a fire just as soon as they see it, and confine it to as small an area as possible, and no pay if they do as their custom in the past has been, back fire from their own lands to protect themselves from the fire just as soon as the fire is anywhere within miles of their farm buildings.

In this way we have secured the hearty co-operation through appealing to the settlers self-interest. When a group of land owners spend hundreds of dollars for the protection of their lands along practical lines, there necessarily is an uplifting influence exerted over the entire community, and with a practical system whereby we can actually show results. We have certainly done much in being a living example to our State. Due to favorable weather conditions, we were very successful this fall having only one or two four or five-acre fires. In the spring we had many fires and much good work was done. Some of them were caught in their incipient stage before much damage was done.

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CONTENTS

1914

THE PANAMA CANAL AND THE LUMBER TRADE—By R. C. Bryant.....	81
With ten illustrations.	
THE TORREY PINE—By Eloise Roorbach.....	92
With eleven illustrations.	
FORESTRY ON THE COUNTRY ESTATE—By Warren H. Miller.....	101
With eight illustrations.	
IMPROVEMENT IN RANGE CONDITIONS—By A. F. Potter.....	110
With seven illustrations.	
WOODLOT FORESTRY—By R. Rosenbluth, M.F.....	118
With twelve illustrations.	
INITIATING A STATE FOREST POLICY IN KENTUCKY.....	135
With five illustrations.	
EXHIBIT AT THE FOREST PRODUCTS EXPOSITION.....	141
THE SPRAG INDUSTRY OF EASTERN PENNSYLVANIA—By John L. Strobeck.....	142
With one illustration.	
FORESTRY COMMITTEE REPORTS.....	145
THE ANNUAL MEETING.....	146
PRIZE FOR AN ESSAY ON FORESTRY.....	149
HETCH HETCHY TIMBER AFFECTED.....	150
FORESTRY LAW FOR VIRGINIA.....	151
GOVERNOR GLYNN FOR FORESTRY.....	151
A SOUTH CAROLINA FORESTRY LAW.....	152
A SYLVAN MEMORIAL—By William R. Fisher.....	153
FULL TITLE UNDER THE WEEKS ACT.....	153
GOVERNMENT MAKES LARGEST OFFERING OF TIMBER.....	154
WHAT A FORESTER SHOULD BE.....	154
ANNUAL MEETING OF THE NEW YORK STATE FORESTRY ASSOCIATION.....	155
MASSACHUSETTS WANTS STATE FOREST.....	155
ANNUAL REPORT ON YOSEMITE NATIONAL PARK.....	156
THE FIRE FOOL—Poem—By A. J. Jackson.....	156
FOREST NOTES.....	157
STATE NEWS.....	159
CURRENT LITERATURE.....	160

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Declaration of Principles and Policy of the American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars, worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,-000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies:

FEDERAL ADMINISTRATION AND MANAGEMENT of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

STATE ACTIVITY by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.

FOREST FIRE PROTECTION by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

FOREST PLANTING by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

FOREST TAXATION REFORMS removing unjust burdens from owners of growing timber.

CLOSER UTILIZATION in logging and manufacturing without loss to owner; aid to lumbermen in achieving this.

CUTTING OF MATURE TIMBER where and as the domestic market demands it, except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.

EQUAL PROTECTION to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

CLASSIFICATION by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

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THE PANAMA CANAL AND THE LUMBER TRADE

By R. C. BRYANT, Professor of Lumbering at Yale University

THE influence the opening of the Panama Canal will have upon certain industries in this country has furnished a fruitful topic of discussion for some time. It is probable that no class of business men have looked forward with greater hopes of increased commercial activity than have the lumber producers of the Pacific Coast, who for several years have been struggling to make ends meet in their business.

There are some who feel that the lower water rate which will prevail when the Canal is open, should permit Pacific Coast operators not only to enter the eastern tidewater markets but they also foresee the possibility of delivering lumber, without rehandling, to Canal boats at Albany, New York, at the terminus of the Erie Canal from which point it may be distributed to the large consuming districts tributary to it. This would not only open a large rural market in New York state but would permit them to invade the famous stronghold of eastern white pine, namely the Tonawandas at the western end of the canal. By reloading at this point, lumber could be forwarded by an all-water route from Pacific Coast points to the large lumber consuming centers on the Great Lakes, including Chicago, the largest lumber market in the United States.

That this dream of conquest will materialize in the next decade seems doubtful, although it may well come true when the supply of eastern woods is reduced.

The reasons why western lumbermen are so keenly interested in the Panama Canal as a market stimulus is that the lumber industry on the western slope of the Rocky Mountains has been in a somewhat demoralized condition due to the low average price which lumber has brought to the manufacturer f.o.b. car at the mill. Competition with other woods, especially southern yellow pine, coupled with a very high freight rate for points east of the Rocky Mountains has narrowed the boundaries of their domestic market to such an extent that only the better grades of lumber could be manufactured and sold at a profit. The prosperous business conditions previous to 1907 led some to make heavy investments in manufacturing plants and others in stumpage, and to-day with depressed market conditions many operators find themselves forced either to close their plants, if they can do so and avoid bankruptcy, or else manufacture lumber at a loss and thus secure a little ready money with which to meet obligations.

A somewhat unique situation exists in the territory tributary to the Columbia river, Puget Sound and other coast points in that the logging and manufacturing interests are usually conducted under separate management, even though both may be controlled directly or indirectly by the same interests. The logger harvests his timber and places the logs on the market often through some log-selling agency, the logs being bought on grade and manufactured by the mills. This sepa-



THE DOCKS AND LUMBER PILES OF THE PORT BLAKELY MILL.

ration of woods and mill work is not common in any other forest region.

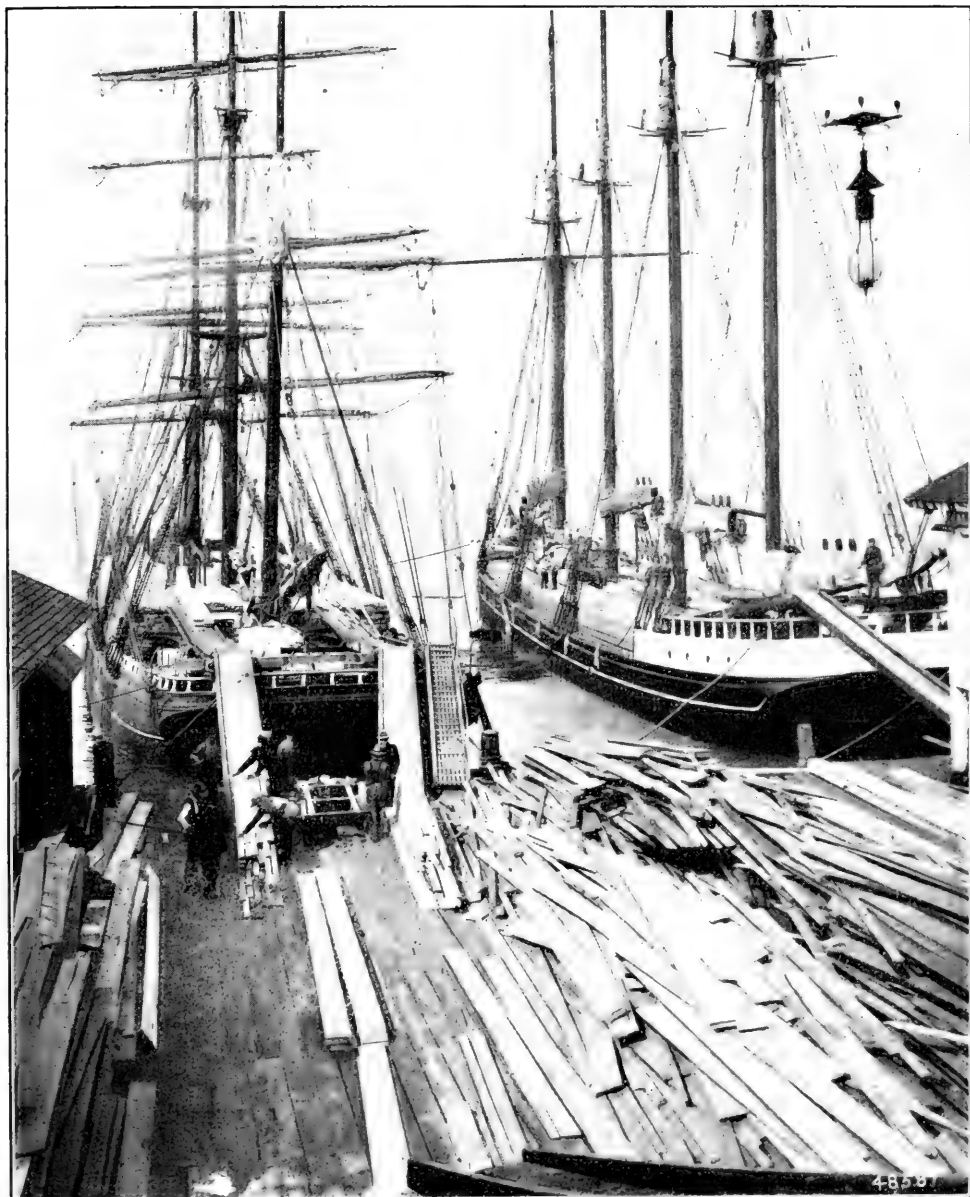
Many mills have been closed or running on part time during the last few months because the operating costs often nearly equalled and sometimes exceeded the sale value of the lumber. Although the price of logs has been low the loggers have been able to keep their camps running without as great loss as that sustained by the mill men since loggers have been able to realize some profit on their stumpage even at the low price which the logs have brought.

The condition of the lumber market is reflected in the statement of an official of a large plant, located on tide-water, which closed down some months ago. "Business conditions in the West, as far as lumber goes, are poorer then during the 1907-1908 panic. Our selling average since May has been from \$10 to \$11.25 per M. Logs cost us about \$9." This condition prevails in the shingle trade as well as with lumber, a manufacturer recently stating that during the past year his average percentage of grades of shingles manufactured had

been 95 per cent of the best and 5 per cent of the second grade, although the normal per cent of production should have been 60 per cent and 40 per cent, respectively. The company wasted material that would have made the extra 35 per cent of the second grade, and when they offered at cost the 5 per cent which they actually manufactured, they could not sell them.

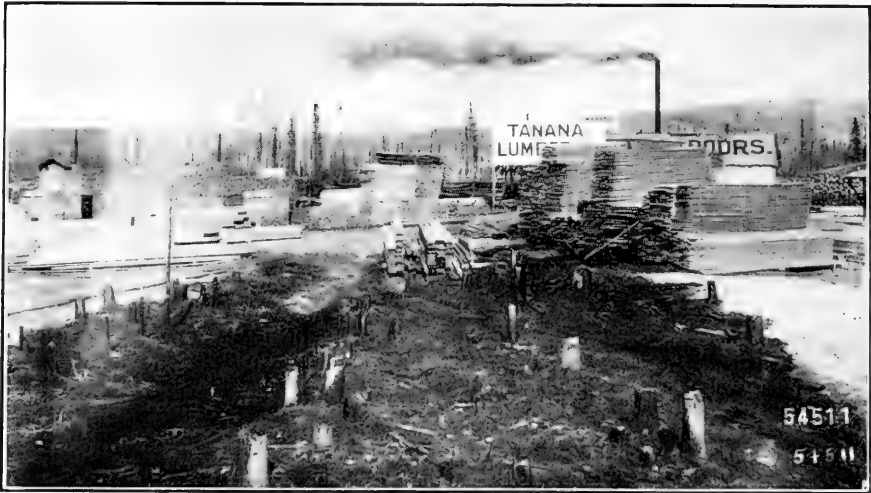
A recent writer on Pacific Coast conditions states that about 25 per cent of the lumber cut of Washington and Oregon goes by water to domestic and foreign ports, 25 per cent is consumed locally and the remainder is shipped by rail to points East and South, chiefly west of Denver, less than 2 per cent going to points East of the Missouri River.

While softwood lumber is marketed all over the United States, the best territory outside of the home states is the great agricultural region of the Middle West which has no forest resources; the vast area east of Chicago and north of the Ohio river, once heavily forested but now largely cut-



DOUGLAS FIR, OF WHICH MORE LUMBER IS CUT IN THIS COUNTRY THAN OF ANY OTHER SPECIES, BEING LOADED AT TACOMA, WASH.

NOTE THAT THE VESSELS ARE BUILT TO CARRY A HEAVY DECK LOAD IN ADDITION TO THAT IN THEIR HOLD. DOUGLAS FIR IS NOW IN DEMAND IN THE EASTERN STATES AND IN MOST TIMBER IMPORTING COUNTRIES.



LUMBER MILL AT FAIRBANKS IN THE INTERIOR OF ALASKA WHICH CUTS TIMBER FOR LOCAL USE. THE FORESTS IN THIS PART OF THE COUNTRY SUFFER GREATLY FROM FIRES. THOSE ON THE COAST ARE LESS LIKELY TO BE BURNED BECAUSE OF THE MORE MOIST ATMOSPHERIC CONDITIONS.

over and in which the demand for lumber for manufacturing and other purposes far exceeds the local production and the area west of the Mississippi River and east of the Rocky Mountains, including Texas, Colorado, Kansas, Nebraska and the Dakotas which have only limited supplies in restricted sections.

The value of the eastern states as a market for outside lumber is shown by the fact that seven states tributary to New York and Philadelphia consume about six billion feet of lumber in excess of the local production, and the area within a radius of one hundred miles of New York consumes as much lumber as the territory comprised in an area within a radius of fifteen hundred miles from Seattle.

The territory west of the Mississippi river is the fighting ground of the yellow pine and Douglas fir trade with some competition in the north from white pine products. West of Denver the Pacific coast products have but little competition but east to the Missouri river the competition grows more keen as the freight haul from the West increases. Beyond this point the territory is given over chiefly to southern yellow pine and to white pine.

Freight rates are the dominating

factor in determining the territory in which a product can be sold profitably. As illustrating this the rates for Douglas fir from Washington and on southern yellow pine from the South may be cited. The all-rail rate on fir products is 75 cents per 100 pounds from the Pacific Coast to New York, which on flooring, per thousand board feet, amounts to approximately \$15, on dimension and common boards from \$18. to \$19.50, on timbers, not green about \$22.50, and on rough green lumber and timbers about \$24.75. The all-rail rate from points in Louisiana which ship yellow pine lumber to the same point as that mentioned for fir is 35 cents per 100 pounds, which is approximately \$7.75 per thousand board feet for longleaf pine flooring, \$9.50 on dimension and common boards, and \$15.75 on heavy timbers.

This gives the yellow pine manufacturers an advantage in freight rate alone of \$7.25 on flooring, from \$8.50 to \$10. on dimension and common boards, and \$9 on timbers. This handicap for fir timber is so great that only a very limited amount of the better grades can now be sent by the all-rail route.

Within the last year or two a very limited quantity of fir lumber has found



LUMBER DOCK AT SAVANNAH, GA., FROM WHICH YELLOW PINE TIMBER IS SHIPPED FOR BOTH COASTWISE AND FOREIGN TRADE.



A LUMBER MILL ON THE TONGASS NATIONAL FOREST, SOUTHEAST ALASKA.

The logs are floated to the mill on the same waters on which their material is later transported as finished lumber. The Alaska National forests are now self supporting and cut material for local use to make boxes for the salmon canneries. A heavy production of pulp is promised from these forests which may be marketed in the east by means of the Panama canal. This forest is at Ketchikan.

its way into the eastern markets via the Isthmus of Panama, due to a combination rail and water rate of from 40 to 50 cents per 100 pounds from Puget Sound points to New York. This rate was inaugurated by a steamship company operating on the Pacific Coast. Lumber has been reshipped from the Atlantic seaboard as far west as Buffalo at a cost of \$125. per car less than it could have been sent by an all-rail route. The amount of lumber sent by the water route has been small because of the limited facilities available, so that this means of transport, has had no effect on transcontinental rail rates.

The question of what water rates will apply from the West Coast to the eastern seaboard, via the Panama Canal, is yet undecided, but it has been estimated that American ships will charge from \$11 to \$12 per thousand board feet for this service. It is doubtful if the amount of lumber traffic through

the Canal from West to East will assume large proportions, at least for some time after the opening of the Canal, because of the lack of suitable American bottoms in which to carry the product. While there are some new lumber carriers now under construction for the canal trade, the total carrying capacity will not be such as to make a very strong impression on eastern markets.

Another important factor is the lack of adequate lumber handling facilities at many of the Atlantic coast ports. A large part of the water shipments which now come both from Canada and from the yellow pine region of the South are in comparatively small cargoes made up of parcel lots which are delivered at various docks. The lumber is also often in mixed lots destined for interior rail trade. Large vessels carrying cargoes of from four to six million feet, which are desirable for long shipments, will find few ports where there are



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A LUMBER WHARF SCENE AT TACOMA, WASH., WITH THE ROLLERS ON WHICH DOUGLAS FIR PLANKING AND HEAVIER TIMBERS MAY BE READILY HANDLED.
IN THE DISTANCE A STERN WHEEL STEAMER OF THE TYPE COMMON ON PUGET SOUND AND THE RIVERS WHICH EMPTY INTO IT.



LUMBER MILLING AND TRANSPORTATION ON THE NORTHWEST COAST.

In the foreground is the log pond from which the material is supplied to the mill. In the background is the lumber fleet which takes the product of the mill to distant ports. Port Blakely, Kitsap Co., Washington.

sufficiently large receiving yards to permit of the rapid unloading of the vessel, and there will be little encouragement for the owners of lumber carriers of large capacity to engage in lumber transport until this condition is remedied.

The laws of the United States regulating coast-wise traffic require that the products shall be carried in American bottoms and this fact alone will be deterrent to the rapid expansion of the eastern trade because of the limited tonnage of vessels available and because of the greater expense of operating such vessels as compared to those of foreign registry which may carry lumber from British Columbia to our eastern seaboard. Cheaper operating labor costs are due to the employment of Asiatic labor, lower interest charges on the investment, and a lower insurance rate. According to a statement of the president of a large steamship company on the Pacific Coast, the reduced expense of foreign vessels will permit the shipment of lumber from western Canada, via Panama Canal, to the Atlantic seaboard for about \$10 per thousand board feet, canal tolls included. If this

low rate is made for foreign vessels, the eastern markets will be more advantageous for our Canadian cousins than for the lumber manufacturers of the Northwest. An added advantage has been granted to Canadian lumbermen through the passage of the Underwood-Simmons Tariff Bill which has removed the \$1.25 duty on lumber, now admitting lumber into this country free of charge.

While it is admitted by all that the wood products of the western forests will supply a large part of the eastern requirements at some future time, due to the gradual exhaustion of timber near-by yet this change, even with favorable water rates from coast to coast will only come about gradually for several reasons. The eastern trade is conservative and has been held for many years by local and by southern lumber manufacturers who have established trade connections and who have carefully studied the requirements of the various classes of consumers. The Pacific Coast manufacturers will find that it will be difficult to overcome these handicaps, unless they can offer a superior article at a lower price. This will hold true so far as ordinary lumber



SITKA SPRUCE LOGS IN THE SAWMILL, BOX FACTORY AND BOAT BUILDING PLANT AT PORT GRAVINA ISLAND, ALASKA.

products are concerned, but even now the West is gradually taking over the trade in heavy timbers since the South, which formerly supplied a large part of this class of material, finds that its supply of stumpage suitable for this purpose is largely exhausted. The eastern market for flooring, finishing and common construction lumber will not be surrendered without a struggle, and it is doubtful if a large part of the trade can be wrested from the southern pine manufacturers until their supply of stumpage becomes so depleted that they, of necessity, must give up some of their more distant markets.

It is not anticipated that fir lumber can influence to any degree the yellow pine trade in the great prairie states of the Middle West, which for many years received vast quantities of lumber from the Lake States, but which in recent times have relied on the South to supply their needs. The mills in Arkansas and Louisiana, for instance, now get into the Chicago market on an average rate of 24 cents per 100 pounds, while the rail rate from the coast is 55 cents. Even though a very favorable water rate were granted from the West via the Canal, Pacific Coast lumber could not get into these markets as readily as yellow pine, since the railrate from Gulf or Atlantic ports would be equal to the

rate now paid from southern mills and, in addition, the western product would have to pay the water rate and handling charges at the point of transfer. From the standpoint of the yellow pine operator, in fact also from the standpoint of the Coast manufacturer as well, a most hopeful sign is that the home demand for lumber in the southern states is increasing at a very rapid rate and in another decade it is reasonably certain that a very large per cent of the lower grades produced at southern pine mills will be marketed at home on a low freight rate, thus automatically withdrawing this product from competition with Douglas fir in other sections.

There is little likelihood of any important movement of timber via water from the East to the West, although a new field for southern hardwoods will be open on the Pacific Coast. The very high freight rates now charged for transporting hardwoods from the Mississippi valley to the western part of the United States practically precludes their use except in the best class of buildings. It is now cheaper to import hardwoods from Asiatic countries than it is to bring native hardwoods over the Rocky Mountains by rail.

While the western tide-water mills will probably be benefited directly to a greater degree than the interior mills



LOADING EASTERN LUMBER AT TIDEWATER AND LUMBER SCHOONERS TAKING ON CARGO AT BANGOR, ME.

by the opening of the Canal, yet the latter also should have an increased field in which to market their products, or at least their present field should be freed from a certain amount of competition which it now meets from the tide-water plants. Most of the Coast mills have rail as well as water connections and cater to the cargo or rail trade depending on which market is the better for the time being. With an enlarged field for their cargo trade the Coast mills will to a large extent abandon their rail trade and leave it unmolested to the interior mills. It is also probable that a greater amount of cargo trade will develop for certain species, such as western white pine, which is manufactured exclusively by the rail mills. This wood is now in demand in the East as a substitute for eastern white pine and even today the cargo trade in this wood is of considerable importance. It is probable that the rail shipments which now reach the eastern seaboard will later come largely by water and in increasing quantities.

The new Canal route should open up a

new export field for western lumber, especially in eastern South America and in Europe—regions which largely have been dominated by yellow pine. However, western lumbermen will find progress slow in both of these sections, because of the old established business connections of the manufacturers of eastern woods. Yellow pine has been an important factor in many European markets for years and has held its own in competition with lumber from Russia, Sweden and Norway, and since the Douglas fir lumber must pay for a haul several thousand miles longer than yellow pine the cost of placing it on the market will be greater. The European markets, especially in the United Kingdom, are exceedingly conservative. Some fir is now used there and the demand for large ship timbers will probably rapidly increase, but a strong campaign would be necessary before the consumer of construction and finishing lumber could be persuaded to buy readily a wood with which they are not thoroughly familiar.

The South American trade of greatest



BOOM OF LOGS AND SAWMILL AT DOUGLAS, ALASKA.

THE DEEP FIORD-LIKE "CANALS" OF THE ALASKAN COAST OFFER EXCEPTIONAL OPPORTUNITIES FOR RAFTING LOGS AND FOR LOADING THEM FROM THE WHARVES TO OCEAN-GOING VESSELS.

importance to the yellow pine manufacturers is in the Argentine Republic where there is a very large demand. Southern shippers are familiar with the needs of this market and would offer resistance to any incursions in their selling territory.

The West Coast of South America will probably always remain largely in the hands of the western lumber producers owing to their proximity. The cheaper freight rate, coupled with the fact that fir lumber usually sells at a lower f.o.b. mill price will largely discourage yellow pine men from seeking to develop a market in that part of the world. The same is true also of the Asiatic markets whose demands for our lumber have not increased greatly during the last decade. It is more than probable that outside of the lumber shipped there from the west coast that the chief supplies will be drawn from Japan, Formosa and Siberia, all close at hand.

It is not to be expected that the opening of the Panama Canal will either be a panacea for all of the troubles

of the Coast lumbermen or the means of giving the people of the eastern part of the United States cheaper lumber, since it will take some years to build up a trade in western lumber and to develop shipping and terminal facilities so that the movement of large quantities of fir lumber will be possible. In the meantime the advancing price of stumpage and the reduction in the annual output of southern yellow pine, its greatest competitor, will have reduced competition and the territory now controlled by the pine manufacturers will gradually be absorbed by the Coast manufacturers without any marked reduction in lumber prices—probably at an increased price. We need not expect cheaper lumber on the eastern seaboard because of the opening of the Canal but we may reasonably hope to have a more gradual increase in lumber values than we would be warranted in expecting if the products of the great forests of the West were not to be made available to us at a transportation cost much lower than now prevails.

THE TORREY PINE

By ELOISE ROORBACH

CALIFORNIA is distinguished forestally, for the frequency of what the botanists call Arboreal Islands—localities pre-empted by a single species of tree, surrounded by a distinctly different flora. Groups of trees of an entirely local character dot the flora of the state as an ocean is dotted with islands. Some of these tree islands occur inland, of which the Sequoia Gigantia (or Washingtonia) is a notable example. But the greater number are strictly littoral. The Monterey Pine is a fine illustration of such an island, being the dominant tree of the Monterey Peninsula and confined exclusively to this very limited area. Monterey and Gowan cypress, Bishops and Knob-cone pine, Santa Lucia fir, Catalina Ironwood and the Torrey pine (*Pinus Torreyana*) form other conspicuous examples.

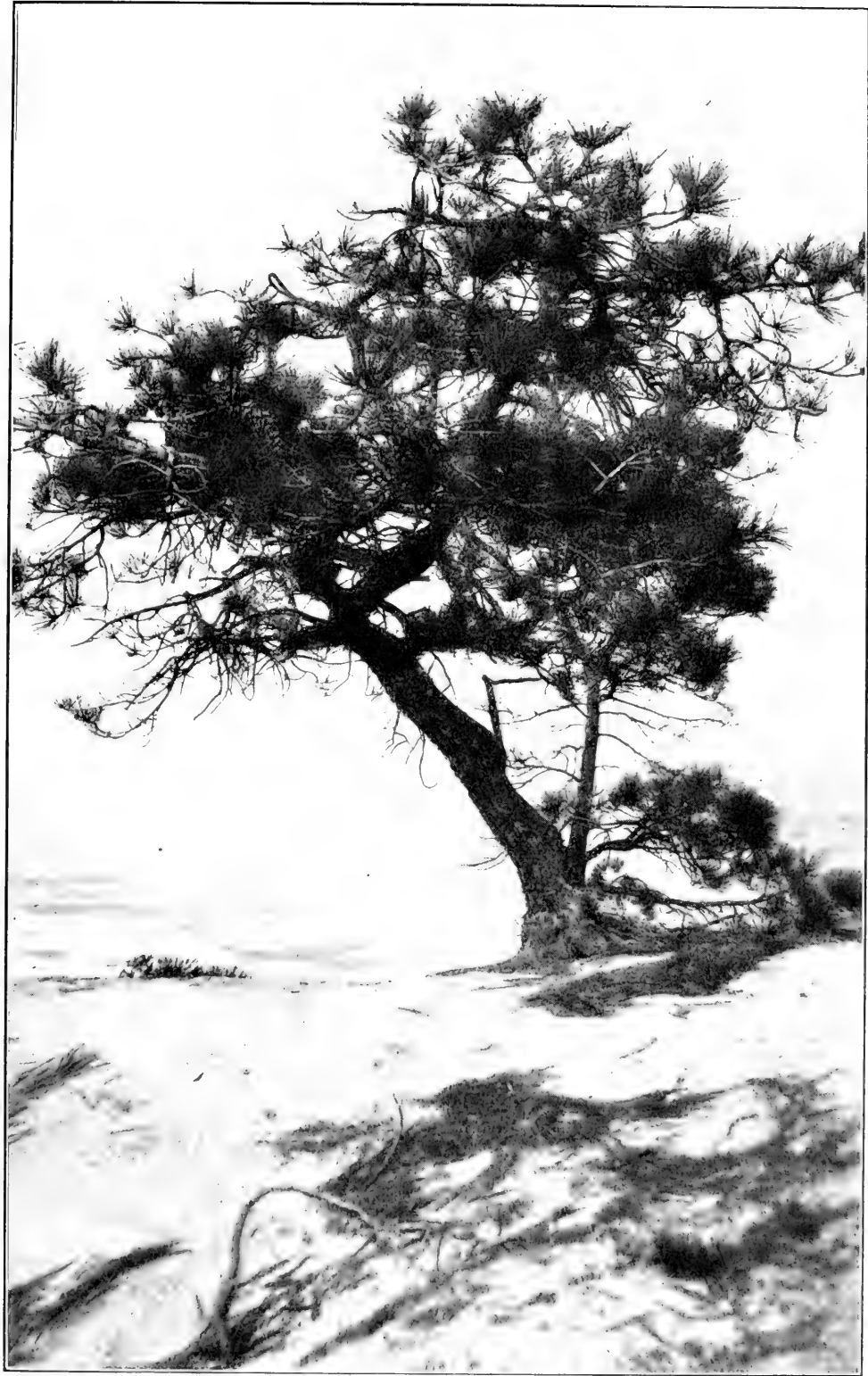
The Torrey pine is restricted to a small tract at the mouth of the Soledad River, just within the northerly limit of San Diego's extensive city limits, and to a few on the Santa Rosa Island,

which is one of the Santa Barbara group. These are its only known stations. The San Diego island contains a roughly estimated two thousand of these isolated survivors of an ancient forest that are making a last brave fight for racial continuance. Upon an arid cliff, overlooking the salt marshes of the river, buffeted by swiftly driving winds from the sea, they stand at bay. Some cling pluckily, with long bark covered roots, to the steep walls of sandstone knolls. Some have heavily buttressed their precariously leaning trunks, bracing against the inevitable as wrestlers thrust out a foot when, resisting an antagonist. Some, foiled by the winds, of their natural endeavor to reach, tall and straight to the skies, sweep the earth with prostrate crown—their reverent genuflection to a higher power. Some are recumbent, creeping along the ground as vines creep, dragging full ripened cones through the rifts of sand. A few boldly toss their stifty contorted branches into the air from the top of a cliff, staunchly braving the



A HARDY, AUDACIOUS TORREY PINE CLINGING PARALLEL WITH THE STEEP SLOPES.

Photo by E. Roorbach.



JAPANESE GROWTH OF A PINE UPON A SANDY KNOLL OVERLOOKING THE SOLEDAD RIVER VALLEY.

Photo by E. Roorbach.

storms, doggedly submitting to the roughly modeling gales. Some grow close to the bluffs for protection and are in consequence often washed with their helpless protectors, far down a crevasses, where they may be seen clinging desperately to any possible foothold. Every tree has been shaped by the influence of the ocean winds into a beautiful individuality of form. No two are alike, each developing a distinctive manner of resisting adverse conditions. Occasionally a branch that has made a bold, straight thrust into the wind has abruptly retreated, bending back upon itself with serpentine grace. Or a determined branch has been forced to yield inch by inch, until it re-curves downward, banyan fashion, and its needles become buried in the sand.

This San Diego island of Torrey pines, being the more accessible and by far the largest, is the goal of many a distinguished botanist, scientist, dendrologist as well as laymen interested only in its very remarkable beauty and wild charm of setting. This rare tree was discovered by Dr. C. C. Parry when on the Mexican Boundary Survey of 1850 and by Prof. John Le Conte. It was named in honor of Dr. John Torrey a distinguished scientist and botanist, by his friend Dr. Parry. Reports of an earlier discovery is exant but it is unreliable and the pine was not classified.

Dr. Jepson, author of the "Silva of California" gives a most interesting account of the formation of these arborial islands. He says "The arborial islands along the coast are taken to be remnants of a great Pleistocene forest. At the end of the Pliocene period there was inaugurated a tremendous series of earth movement on the California coast. Geologists are by no means agreed as to the period and duration of these oscillations but in the Tertiary and Quarternary there was at intervals, land connection between the present mainland and the Santa Barbara Islands. A moister climate in the Pliocene or Pleistocene periods would permit the existence of a great forest along the California coast and its extension down-

ward over a large area which now rests beneath the Pacific ocean, save for the immersed peaks of the Santa Barbara Islands. Subsidence of the mountains



A TORREY PINE.

Drawn by E. Roorbach



COMPANIONS.

Drawn by E. Roorbach.

South Coast Range area left only vestiges of this forest on the immersed peaks or islands. Between these islands the tides flowed through the waterways of Pacheco Pass, Ponoche Pass, Warthan Pass etc., connecting the ocean and the inland sea of the Great Valley. The final uplift of the Coast Ranges, with the species following the receding shore downwards, accompanied by changes and diversifications in climatic conditions would account for the persistence and isolation of the present arborial islands of Monterey pine, Monterey Cypress and other species along the California coast line. Subsidence and uplift would also explain the presence of species on the Santa Barbara Islands and not on others by reason of the difference of altitude among the islands."

Darwins oft-quoted statement that "The Oaks have driven the Pines to the sands," comes to mind when seeing this remarkable, interesting company of pines. They have, like wise fighters, entrenched themselves from further invasion by retreating to a territory so bleak and forbidding, no foe would care to enter within its borders. Their arid reservation is only about a mile wide and eight miles long. To the north Del Mar can be seen through their cone fringed branches. To the south, La Jolla lies, framed by strangely twisted trees. To the east, the Los Penasquitos and McGonigle canons lead the vision far on to the deeply colored, purple and amethyst Cuyamaca mountains. The outlook is wild, barbaric in color as is characteristic of southern California's mesa lands.

The rains have poured heavily upon this pine encampment, as it has a way of doing in semi-arid districts and washed deep ravines toward the river and cut sharp angular paths to the sea. Some of the fissures are one hundred and fifty feet or more in depth, somewhat rounding, imitating in soft sandstone miniatures, the granite formations of Yosemite. In other places sheer walls have been gashed from flat table lands with a formation reminding forcefully of the Grand Canon. Sulphur and iron out-croppings have streaked these deeply eroded walls with yellows, reds, blues and grays. When the sky is blue and the sun shines brightly upon these mineral painted fissures topped with yellow sands, the spot rivals the famously gorgeous painted desert colorings of Arizona.

The surf that continuously dashes the soft cliffs, have occasionally claimed whole points, leaving jagged, raw looking scars in the steep banks. Mesambryanthemum, coarse grasses, opuntias, obtain a footing in the cracks of these bare walls with daring flashed of color. The trees lean away from these treacherous shores with dramatic vigor, quite as if in rushing flight from an enemy. They rush up narrow defiles, huddle together in canons, ambushing themselves behind jutting cliffs. A few lie flat upon the headlands, as if scouting, Indian fashion. The whole impression of the place where these stunted trees exist as best they may, is as if danger lurked everywhere and storm and destruction were ever immanent. The form of the trees, the gashed lands; the savage, brilliant colors, combine in making a spot of wild beauty as well as one of exceptional scientific interest.

Under cultivation in inland parks and gardens the trees grow symetrically. They are straight of trunk, full of crown and much taller, with outward swinging branches of greater length and of softer curve. Here in the unprotected land of their retreat, adverse conditions have made them short, compact, tough. Their branches are held close to the trunk, the crown is small. They rarely exceed a height of thirty five feet or a diameter of fourteen inches. The bark

of the older trees is of a redish brown color, about an inch in thickness, composed of wide flat scales broken into



ITS GROTESQUE ARMS STRETCHING TO THE FAR,
FAR WEST.

Drawn by E. Roorbach.



THE SCATTERED GROWTH ALONG THE ROADWAY.

Drawn by E. Roorbach.

deep, irregular ridges. The bark of the young trees is grayer and quite spongy. The wood is brittle and wide grained. The needles tough, unusually long, being from eight to twelve inches in length and in fascicles of five. They are dark grayish green, clustered in heavy looking bunches at the end of thick, knotty branches. The cones are triangularly oval, about four to five and one half inches in length, strongly attached to the branch by short, thick stems. They ripen in the early fall of the third year but persist upon the tree for four or five years. Cones of all ages of growth hang upon the tree at the same time. The seeds are dark brown with yellowish streaks and are ranked with the Digger and Big Cone pine, the Parry and One-leaf Pinon in food value. The seeds often remain within the cone several years after it has fallen to the ground.

The Torrey pine, in order to counteract excessively adverse conditions, are prolific bearers. The cones are dark brown with an upward turning spike on the end of each scale. The scales do not readily release the seeds while on the trees but wait for the winds to send them rolling down to the pockets of earth. Unless the seeds are washed into crevasses of the earth that are filled with mineral soil, they are not apt to germinate. So the tree spreads slowly, but now that this tract of land is under the care and direct supervision of a city forester, a new and hopeful growth is gaining a footing. This pine is thought to be short lived, barely reaching to a hundred years of age, as far as can be determined. Yet the strange feature of this island of pines is that there are no dead stumps to be seen and no scars in the ground from which they

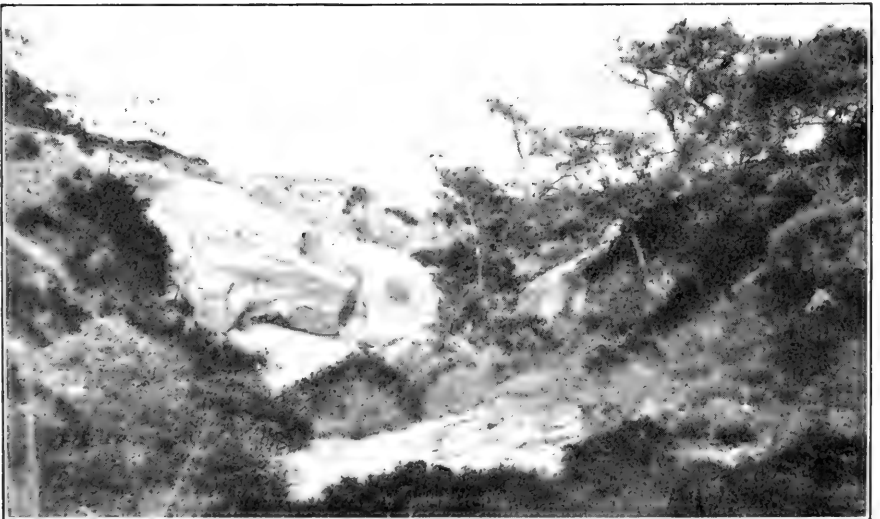


SHOWING THE STUNTED GROWTH OF THE TORREY PINE UPON THE RIDGES.

Photo by E. Roorbach.

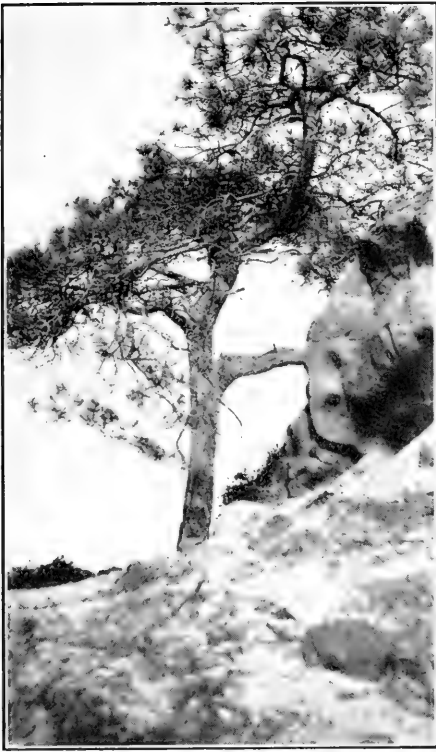
might have been removed. It is supposed that the Indians carried away the fallen logs for fire wood and that the sands buried the scars made by digging for each bit of root. The tree flowers in February and March, the pollen bearing blossoms being large, terete, light brown in color and clustered thickly at the ends of the branches.

These pines are being companioned by many small shrubs and flowers which have crept in from the surrounding mesa for protection. Wherever shrubs grow, the birds congregate. So Torrey Island is developing into a most interesting resort of bird, flower and shrub. Its plant life is of unusual interest for the local species of beach and mesa have



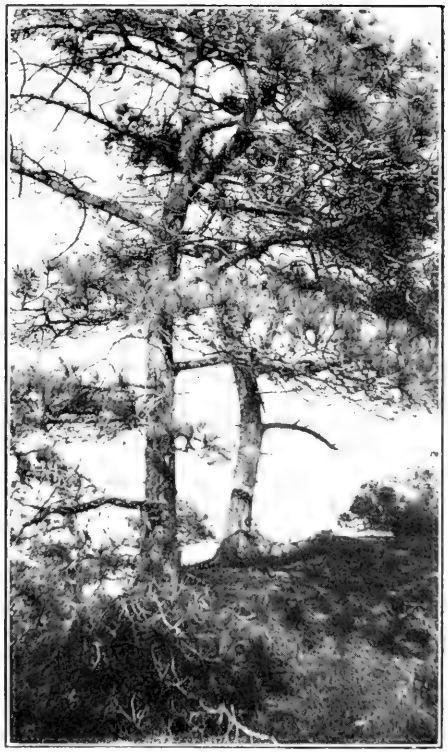
SHOWING THE ARID BLUFFS AMONG WHICH THE TORREY PINES ARE LIVING.

Photo by E. Roorbach.



PROTECTED FROM THE WINDS BY SANDSTONE BLUFFS THE TORREY PINE GROWS TO ITS FULLEST HEIGHT.

Photo by E. Roorbach.



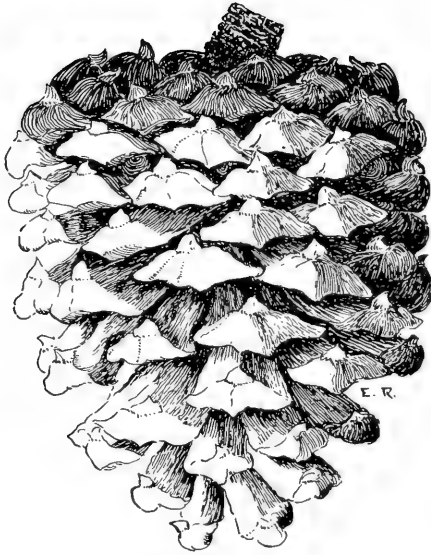
UNUSUALLY TALL AND SYMMETRICAL TORREY PINES GROWING IN THE LEE OF A CLIFF.

Photo by E. Roorbach.

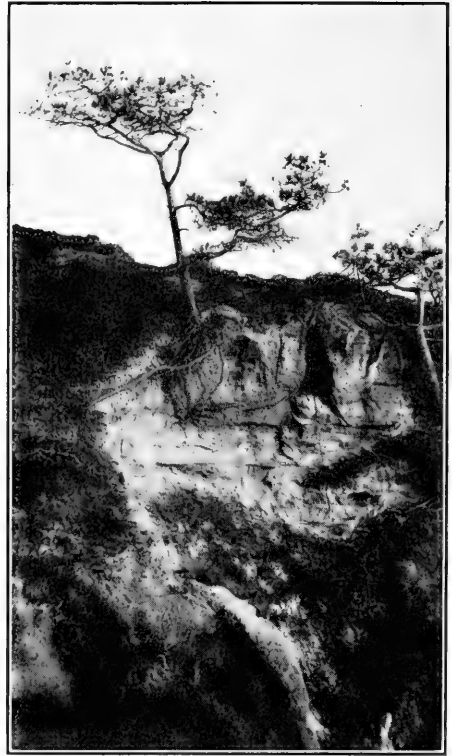
been augmented by many an immigrant from distant habitats which find the needle-covered sand and the shade of the trees quite to their liking. Fortunately the state has become interested in this scientifically valuable group so these kindly protectors of shrubs will not be crushed out by too vigorous upstarts. Pine and Oak insurgent history will not be repeated on this refuge island. The shrubs are now of real benefit to the trees by shielding the seedlings from the winds and by conserving the moisture to a great extent. *Ceanothus* fills the canons with fragrance in the spring. Toyon makes it gay in the winter. Mahogany, sumac, laurel, manzanita add their flower beauty. Yerba Santa and several sages join the buckthorn and chaparral. The tree poppies dapples the sand with petals of gold. Clematis trails long green vines over brown

needles and hangs white blossoms far down dark ravines. *Nemophila* and gillia drift daintily over sheltered slopes. *Mesembryanthems*' succulent foliage clings in many a sandy sift. Lilac sand-verbena runs gaily among tall clumps of blossoming grasses. Maraposas stand poised gracefully above opuntias barbed leaves. The Spanish bayonet rears its thousand-tapered candelabra above velvety lichenized rocks. Ferns thrive a brief season under their lea.

San Diego, thanks to the generous policy of the early days, includes 47,000 acres of land within its city limits. At the present phenomenal rate of growth, there actually seems to be danger of its outgrowing its tremendously large grant of land—deeded to it in the days of its infancy. This little grove of rare trees has been reserved as a permanent city park—a wild, lovely park, always to



A TORREY PINE CONE.

Drawn by E. Roorbach.

THE ROOTS, IN SEARCH OF MOISTURE, SOMETIMES
 DRIVE AWAY THE CLIFFS BUT THE TREE
 HOLDS IN MYSTERIOUS WAY TO THE
 POOR SOIL, AND SUCCEEDS IN
 RIPENING ITS CONES.

Photo by E. Roorbach.

be kept inviolate. To be carefully preserved from civilization ruthless advance. To be left unhindered of its own charming, spontaneous way. No close cropped shrubs, no stiffly bordered paths, no star and anchor beds of exotic hot-house aliens will ever disfigure its natural beauty. There is a city forester in charge who sees to it that they are let most gloriously alone, that thoughtless folk do not chop them into firewood, nor curio hunters carry away their patiently ripened cones. But nature will continue to train the vines, the winds to prune the trees, the flowers to congregate in informal tangles according to their own delightful vagaries. This little wild park sheltering the last remnants of a vanishing race, is an immense asset to the city of San Diego and is a living monument to the far-seeing city authorities who have legis-

lated it into permanent safety. It is beyond the despoiling reach of investors and promoters. It will never be subdivided into home lots or leased to factory sites. Everyone in America interested in the conservation of our rapidly vanishing wild places must rejoice to know of San Diego's considerate care of this accessible, beautiful wilderness of untouched growth.

A rancher has applied for the rental of 320 acres on the Pike national forest, Colorado, to be used in connection with other private land, for raising elk as a commercial venture.

The Government has just sold 43,000 cords of cedar wood for shingles from the Washington national forest. The shingles manufactured from this wood, laid six inches to the weather, would cover $2\frac{1}{2}$ square miles of roof.

The navy department has asked the forest service to investigate guijo, a Philippine wood, for possible use in decking boats and ships. Longleaf pine, sugar maple, and beech are the domestic woods most used for decks.

FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER

PART II. THE STONY PASTURE

AS I said before, forestry is nothing if not practical. If you know from the farm records that the pasturage yield from your stony acreage does not exceed from one to two dollars per acre per year, rest assured that you will do better, far better, with a well-managed forest on the land. (This statement applies in general to all stony and brambly pasturage, relics of the Glacial Age, clear across the United States). The trend of modern dairying is all in the direction of rich pasturage cut and carried to the stock, and land that must be hand-cut, ruinous or impossible to machinery, is better in trees.

Suppose then that you have decided that a certain ten acres will pay you best in forest. The first question will then be what species to plant; and immediately the three factors of climate, soil and rainfall require your careful

consideration. Your first and most reliable guide will be Nature herself. What trees is she growing now in your woodlot? Which are evidently the survival of the fittest? In judging this question do not overlook man's interference in the processes of nature. The chances are your woodlot has been logged long ago, of its white pine and the ancient stumps will be discovered, buried here and there in the leaf mold. Years ago the lordly white pine, the noblest of eastern conifers, stretched in unbroken forests from Maine to the Western prairies and as far south as our coastal sandy plains, the home of the yellow pines. In Southern Jersey you will find it mixed with shortleaf, pitch pine, red oak and white oak on the rich sandy loams that extend down from the limestone ribs of the State. It thrives equally well on the slates of Pennsyl-



THE STURDY EVERGREENS STAND ERECT AGAINST THE SNOWS.

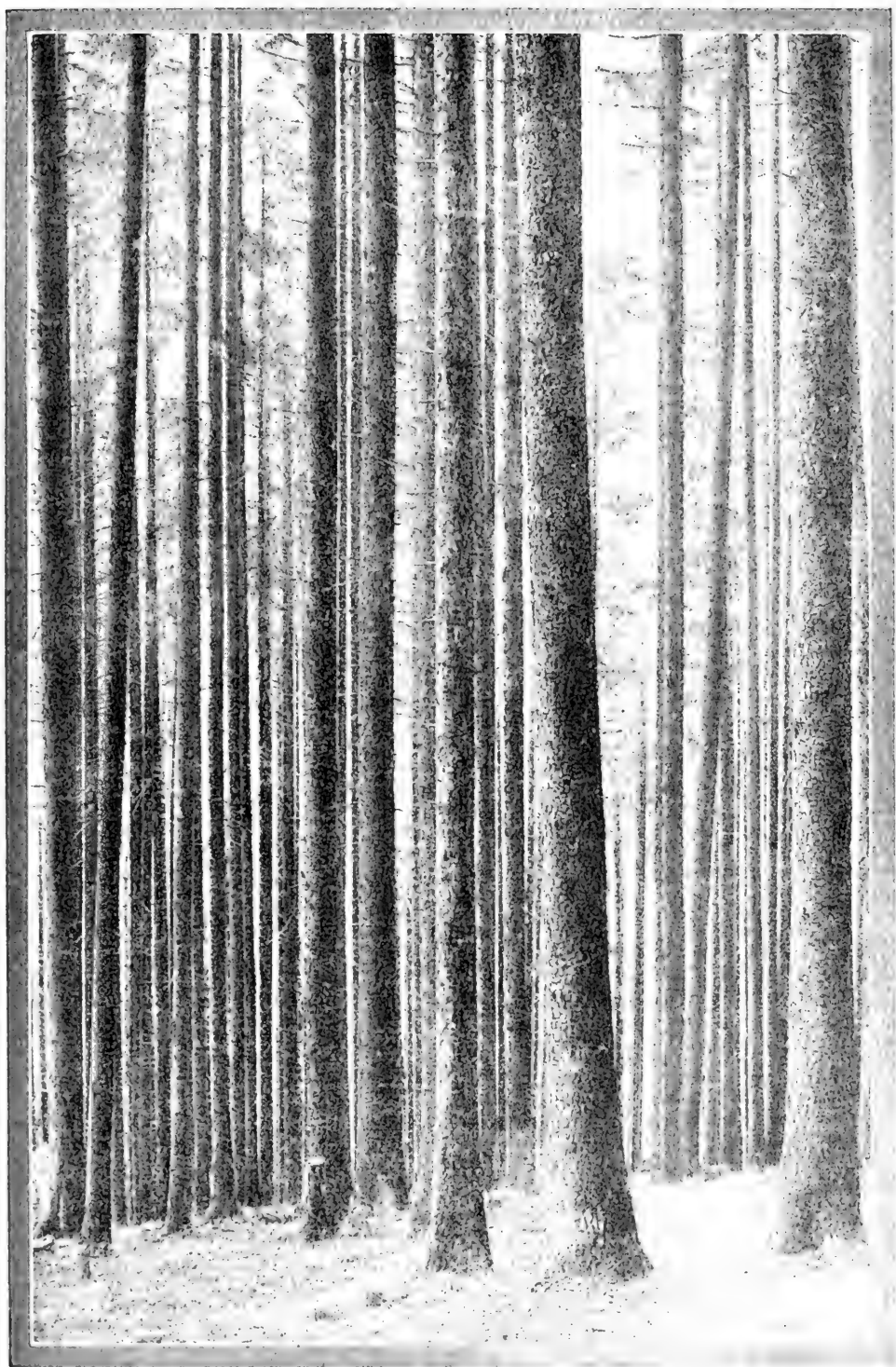


RED PINE, PLANTED SEVEN YEARS AGO ON A TWENTY-FIVE ACRE TRACT.

vania, the granitic bases of New York and Maine, and the Champlain gravels of the Lake States. Given the one requirement of moisture it is hard to find a soil that will *not* grow white pine. It will not however succeed in arid, non-nutritive soils that will not hold, in a reasonable fashion, the seasons's rainfall. The red and pitch pines are better for such. Nor will it stand over-much heat. South of Masons and Dixon's line, except in the mountains, it would be foolish to try it. Commercially genuine white pine, *pinus strobus*, stands at the top of our construction woods, selling for \$100 a thousand board feet in the lumber yard.

In cold Northern places such as the New England States, Northern New York and the Northern border of the Lake States, I would try spruce for my planted forest. The market for it is much more nearly to hand than with white pine, as the paper pulp mills are always hungry and the stumpage of spruce is steadily rising, having doubled in the last ten years. You can sell everything that you raise, including the

thinnings, and all the timber in the tree down to the four-inch cull of the top. As to what spruce to plant you will find yourself in a beautiful quandary just as soon as you get well into the subject. We have in the East the beautiful Canadian white spruce, hardly of large enough growth to be a commercial species; its sturdy brother, the Adirondack red spruce; and its swampy cousin, the black spruce. Then there is the familiar, imported Norway spruce, to which most of our big paper companies are pinning their faith. I do not like it; it's an exotic and a foreigner and I have seldom seen one in a windbreak or anywhere else in America that grew over 60 feet high before it began to peter out. Our climate does not agree with them. I can show you Norway spruces in the forest of Gilley in France that are 150 feet high and three feet in diameter: I have been through dozens of spruce forests in Thuringia and Saxony and have stood on the edges of ravines with Norway spruces two hundred feet high rising sheer up to me from the bottom-most depths of the



100 YEAR FIRS IN THE VOSGES, FRANCE

A Fir forest in the Vosges planted by school children. The ground cost originally 100 francs a hectare. At 60 years the firs were worth 5,000 francs per hectare. Today they are valued at 14,000 francs or \$1,500 an acre.



PLANTATION OF SCOTCH PINE, SIX YEARS OLD, NEAR LAKE PLACID, NEW YORK.

ravine. The Norway spruce cannot be made to grow like that here, except in nurseries and arboretums—not in the rough-and-tumble of a stand of growing forest.

Our own red spruce will. There are lots of them in favorable localities in the Adirondacks, reaching 3 feet in diameter—and every place in a well managed forest is a “favorable locality.” The red spruce is a slower grower than the Norway and as the pulp men are after quick results they plant Norway and cut at 12 inches diameter growth. At least that is their present intention. They will eventually realize, as the European foresters have, that during those years *after* the twelve inch diameter, during the prime of its life, the tree puts on a far greater volume of wood per year, and that it is better to wait an extra twenty years thereby more than doubling the volumetric yield. 'Tis then that they will wish they had planted the tree that Nature has fitted to do that very thing, our own Adirondack red spruce.

And, let me caution against attempt-

ing any experiments with the various Pacific Coast spruces, the magnificent Engleman Spruce and the Douglas Fir (which tree, in reality, is a hemlock). While they have all been successfully raised in arboretums, they are entirely unsuited to our climate, and practically all the plantings that our state forest services have attempted with them have been complete or partial failures. The Western pine alone seems to thrive equally well here in the East, and to them may be added Parry's blue spruce, which is hardly throughout the “peach belt.” Do not however conceive the idea that if you plant a forest of blue spruce you will shortly have a collection of young specimens worth a dollar a tree. The beautiful light blue spruce which delights the eye on every suburban lawn is the so-called Koster's blue spruce and was got by grafting selected light blue shoots on Parry spruce roots. The seeds from it revert to the original stock, which has a dark, silvery, bluish tinge, except in the young spring shoots. The natural home of the Parry spruce is in the canyons of South-



WHITE PINE SEEDLINGS SET OUT FIVE YEARS AGO.

western Utah and Nevada where occasional "sports" show the desired light-blue coloration and from these the "Koster" stock was originated.

In poor, dry, sandy soils, such as are encountered here and there in New England and the Lake States, I should not advise either white pine or spruce. Time was when such ground was planted in imported Scotch (or sylvester) pine. We have since learned better. Time has shown that in our climate and soil the red pine will give finer and healthier trees, and will be just swinging into its prime when the sylvester begins to give up the struggle against the vicissitudes of our climate. The red pine, also called "Norway" pine, not after King Kaakon's country but named after that noble locality, the hamlet of Norway in Main, has the same climatic range as the white pine. It grows in company with it, taking whatever soil is too poor for the white. It will not thrive where long, hot summers and droughts are to be encountered, in general not much south of Northern Pennsylvania. South of that the much-maligned pitch pine can take it splace. This species is renowned for its thick leafy verdure, its fire-resisting capacities and its everlasting wood. As it fills a special niche in the woodworking industries you will always find a market for a small planted forest of it—and the

bright green bushy trees are a joy forever to look at.

Having decided upon your species, the next problem will be where to get the trees and how to plant them. Paradoxical as it may seem the State nursery four-year "transplant" is the cheapest of all planting stock. Cheaper than seeding, seedlings, or transplanted forest stock. The four year state transplant costs \$4.80 a thousand in white pine and \$5.12 in Norway spruce. Two year old seedlings cost around two dollars a thousand but their percent of failure ranges 50 to 60% making the ultimate cost the same, to say nothing of the cost of replanting. As for seeding, either broadcast or in seed spots, by the time you have bought your seeds at around \$1.50 a pound, prepared your ground, sown the seed and then thinned out the seedlings and rescued them from weeds your cost will run at least \$10. an acre against \$8. an acre for four year state transplants that are already four years ahead. In the state nurseries the seedlings are grown, 7,000 of them to a bed 4 ft. x 12 ft. and in their second year are transplanted six inches apart by twelve in the rows in the nursery fields. At the end of two more years they have grown to bushy little trees a foot high with compact, vigorous root growth. Planted in the open fields or on old burns or brush land their percent of



SCOTCH PINE AT BRETTON WOODS, N. H., PLANTED BY THE BRETTON WOODS CO.

failure is only three to five percent. They are so hardy that I have picked up New York State transplants at Saranac, pulled up with no more ceremony than one would devote to a head of lettuce, and then after carrying them down to my place in South Jersey, they laid firm hold on the soil and next year had two feet of crown to show me. Granite base soil of New York, sandy loam of South Jersey, it was all grist to those lusty young white pines. A Scotch pine seedling taken at the same time only barely recovered from this treatment. The transplants come to you in April or May, upon application to the State forest service made sometime during the winter. They will arrive buried in wet sphagnum moss and you are to guard them above all things from drying out, for a sun-dried root is a dead root, nor all your penitence and tears will avail to lure it back to life again. If you are not ready to plant, heel them in a shallow trench on the planting site. Your planting gang will be in units of two men and should get in 600 plants a day. The hole man goes ahead with a mattock and lays bare a shallow hole with a single stroke of the

mattock. He must have a good eye for alignment on the sighting poles, and either step his paces evenly or space his holes with a stick gauge. His mate follows with a pail full of transplants with their roots buried in muddy water. He plants the trees, surrounding the roots with the topsoil lifted by the mattock man finishing off with the base soil to discourage weeds. At the end of the row they move the sighting stakes and start back. On slopes and dry ground this will be all the planting labor expended, as Nature is kind in May and the young trees will not lack for showers and moisture. In rocky soil the mattock man will have harder going and may need a helper to dislodge boulders in his path or dynamite to destroy them.

If you run into swampy soil the trees will surely die of wet feet unless you use the mound planting method of Baron Manteuffel. The mattock man cuts two large crescents of sod, and the planter first builds a little mound of earth of the soil in the sod roots, plants the young tree with its roots in the mound and then covers the mound with the two crescents of sod, grass side in,



THE FOUR OPERATIONS IN PLANTING A SEEDLING.

the north crescent always overlapping the one on the south side. This makes a firm cone of plant food surrounding the tree roots, one that will not wash away by weathering. The Baron used it even on good dry soils, and claimed that, though more expensive than ordinary hole planting, it paid because of the quicker and sturdier growth of the trees—and his extensive forests at Colditz in Saxony (just above Meissen) go far to prove it.

Once having made your plantation you will not see anything very impressive at first. Little rows of dark green tufts that look as if they would never amount to anything. Along about the third year you will suddenly awake to the fact that you have here a potential forest for the trees are above your waist line. By the sixth year the leader shoots are taller than your head and by the twelfth year they will be thirteen feet high with trunks three inches in diameter and crowns of nine feet spread. In the twentieth year they will be six inches in diameter and twenty five feet high and you must then thin

out and sell at least half of them. The rest will reach 8 inches in their thirtieth year and require another thinning; ten inches in the fortieth year and twelve in the fiftieth, with about two hundred trees to the acre. Such a tree will be about 60 feet high with a 24 ft. crown and they will stand on about 18 ft. centers. You can either cut them all and replant or thin still further, going up to 16, 18 and 24 inch diameter. It is good forestry to do this, for remember that each year the tree adds a quarter inch of wood all around the trunk and it means a lot of added volume per year in these larger diameters. In fact your total yield will double during the following twenty years.

In giving this brief sketch of the life of a planted forest, the reader will gather that it is not well to plant the entire forest at once. Far better is it to plant a few acres each year, making successive *sections* of even-aged stands. Your forest will then become an integral part of the estate and have its niche in the yearly calendar of farm operations. Each year there will be



PLANTATION OF WHITE PINE EIGHTEEN YEARS OLD.

planting to do, thinning on other sections and in due time a steady yearly yield of lumber to market.

I have confined this dissertation to conifers, partly because the lumber situation is steadily growing more acute with them, partly because State raised conifer transplants may be had in large quantities cheaply. And in case your state has no well equipped forest service there are at least a dozen large forestry concerns which are able to furnish you millions of transplants at prices equal to or lower than the State nursery charges.

A few more words as to forest arrangement: The spacing of the young trees has always been a matter for argument pro and con. In Germany it is very narrow, spruce, fir and sylvester pine being all planted on one meter spacing or even less. As they have a ready market for all the thinnings, poles, and fagots, the arrangement is a logical business outcome. But with us small thinnings are a source of embarrassment and a six-foot spacing gives the trees a change to reach fifteen years growth before a thinning becomes imperative. And they are best planted in quincunx, that is with each alternate

row staggered, the reason being that a tree taken out then gives the maximum growth space for the surrounding survivors. A thinning should be planned so as to leave the crowns of the surviving trees nearly touching, and always take out the suppressed and spindling trees so as to give the dominant sturdy specimens a chance to make their maximum growth. You will need fire and logging lanes between the sections. In laying out either, remember that the crown of any tree not crowded by neighbors will have a diameter in feet equal to three times its trunk diameter in inches. The trees bordering a fire lane come under this rule. A twelve year white pine with three inch trunk will then have a crown diameter of nine feet, that is, its longest branches will be four and one half feet long. Sections of this age should have a ten foot fire lane separating them wherefore the border transplants should be nineteen feet center to give you a ten foot fire lane must be widened to twenty-five feet, usually done by taking away the outside row of trees, first on one section and then on the other. In general these fire lanes should occur about four hundred feet apart throughout the forest.

(To be continued.)

The State university lands in Arizona are to be lumbered under a cooperative agreement between the Government and the State land commission. Arizona is the first State in the southwest and one of few in the country to cut its timbered lands on forestry principles.

Makers of phonographs are aiming to use wood instead of metal in all parts of the instrument where this is possible, in order to increase the mellowness of the tone.

On the Pocatello forest, Idaho, 230,000 trees were planted during the past year, and almost half a million in the past three years, fully three-fourths of which are alive and doing well.

Experiments in the use of aspen for shingles show that the shingles do not check in seasoning, and that they turn water satisfactorily, but that they are too easily broken in handling.

There are somewhat more than 500 recognized tree species in the United States, of which about 100 are commercially important for timber. Of the 500 recognized species, 300 are represented in the Government's newly acquired Appalachian forests. All American species, except a very few subtropical ones on the Florida keys and in extreme southern Texas, are to be found in one or another of the national forests.

D. E. Lauderburn, a forest engineer, has withdrawn as a member of the firm of Vitale and Rothery of New York City, and is now engaged in the business of timber estimating and other branches of forest engineering at 56 Worth Street, New York City.

IMPROVEMENT IN RANGE CONDITIONS

By A. F. POTTER

Associate Forester United States Forest Service

EIGHT years have passed since the Forest Service took charge of the National Forests and it seems opportune at this time to review what has been accomplished. Our job in the main is to protect this most valuable public property against destruction by natural agencies and to secure the widest possible utilization of the forest products under a plan which will preserve the permanent productiveness of the Forests. In other words, to preserve the forests and make them add most to the public welfare. Upon our success in this regard depends the permanence of the National Forests, because to secure and hold the support of the people we must manage their property in a manner which is generally satisfactory to them.

When the first National Forests, or Forest Reserves as they were then called, were created, it was with the idea only of keeping in government ownership lands having valuable stands of timber which should be held to meet the future needs of the people. No provision was made for even the utilization or sale of the mature timber until several years afterwards, and even then little thought was given to use of the other products and resources of the forests. While it was known that the lands were being used to some extent for the grazing of livestock, this was looked upon as only a temporary use which most likely would have to be discontinued before any extension of the forest or improvement in its condition could be secured. Therefore, the tendency was to restrict grazing very closely, particularly the grazing of sheep, and either prohibit it entirely or treat it as something which must ultimately be discontinued. This was practically the situation at the time the National Forests were transferred to the Department of Agriculture and came

under the jurisdiction of the Forest Service.

FORAGE RESOURCES A VALUABLE ASSET

The outlook for the stockmen at that time was not a very bright one and naturally many felt that the maintenance of the National Forests was detrimental to their interests. It was realized in the beginning by the Forest Service that the forage resources of the National Forests represented a valuable asset upon which not only the welfare of the stockmen but that of a large proportion of the people was dependent, and it set about to work out a plan which would develop this resource and promote its use to the fullest extent consistent with good forest management.

The first thing to be done was to open up for use many areas from which stock had been excluded and to authorize grazing upon many areas which had previously been unused. The next was to substitute full use of all areas added to the Forests for the earlier policy of restriction. The result was that during the first three years, or from 1905 to 1907, the area of the average grazing unit was reduced about one-third, or in other words, the number of stock grazed upon the National Forests in proportion to the area of the range increased about 50 per cent.

BAD EFFECTS OF OVERGRAZING

Unfortunately, however, many of the areas which were added to the National Forests during this period had previously been badly overgrazed, and it was evident that a material reduction must be made in the number of stock grazed there before damage to the forest could be stopped, or before it would be possible to secure any improvement in the condition of the range. This made it necessary first of all to ascertain the extent to which the overcrowded con-



LARGE PARK IN WESTERN YELLOW PINE TYPE, SHOWING GRAZING POSSIBILITIES.

dition of these ranges could be relieved by the transfer of stock to other ranges and also to find out to what extent the damage could be checked by better management of the stock. A splendid opportunity was thus offered for constructive work which would be of real substantial benefit. It was a task not alone for the Forest Service, but also for the stockmen, and how well it has been done is shown by the results.

COOPERATION OF STOCKMEN INVITED.

Right in the beginning the Forest Service invited the cooperation of the stockmen and consulted with them regarding the practicability of the plans which were to be adopted. While it was not always possible to agree, there was generally a mutually advantageous settlement of all questions involved and most important of all, there grew up a feeling among the stockmen that the government desired to help bring about a more stable condition of their industry.

The greatest amount of damage on overgrazed ranges was due to the fact that prior to the inclusion of these lands within the National Forests there was no legal authority for their control. This usually meant that the feed belonged to the man who got his stock

on the land first. There was no way, however, except physical force, by which he could hold the feed and prevent others from sharing in its use. Under this system numbers of stock largely in excess of the capacity of the lands were grazed upon them and with little thought or care except to get what there was while it lasted. It was natural that this condition should lead to serious controversy, and out of it grew many range wars which often resulted in great loss to life and property. These deplorable conditions have been removed on the lands which were included within the National Forests, for the simple reason that an authoritative means of control has been afforded under which right instead of might prevails. Had nothing else been accomplished, the removal of this one evil has made the work worth while.

As an orderly use of the range was being brought about, an effort was made to divide the range fairly between the different kinds of stock and the different owners. The stockmen were called together in meetings and so far as possible all questions were settled by mutual agreement, the government making arbitrary decisions only in cases where the stockmen could not agree among themselves or where it appeared



MOVING A CAMP OF GRAZING EXAMINERS IN ROUGH COUNTRY.

necessary to protect the public interests. Where it was clear that the ranges were being overgrazed and the surplus stock could not be taken care of by removal to other ranges, the necessary reductions were made gradually and so far as possible unnecessary loss and hardship were avoided.

RANGES GRAZED AT WRONG SEASONS

It was found that under the former system, or rather lack of system, many of the ranges had been used at unseasonable times and that this had resulted in the loss of much forage. An economical use of the forage plants and grasses can be secured only by a consideration of their natural habits, and it is just as disastrous to place stock upon a range before the forage crop has reached a sufficiently mature stage of development to be ready for grazing as it is to cut a field of hay or grain before the proper time. Accordingly grazing periods were established to fit the different districts and so far as possible to meet the needs of the stockmen, due consideration being given to the necessity for early grazing on lambing grounds and other special conditions. On many of the ranges the destruction of forage by trampling in driving the stock about in search of feed and by placing stock

upon the range too early in the season while the feed was immature, amounted to fully 30 per cent of the crop. Under a systematic use of the ranges this loss was stopped and the formerly wasted feed utilized for the grazing of additional stock or for putting the stock in better condition of flesh. The result has been that in many cases the stockmen have been able to sell beef and mutton from ranges which before were only producing feeders and often poor ones at that.

FENCES RECOGNIZED AS NECESSARY

One of the greatest handicaps of the stockmen using the open public range for raising cattle and horses had been the prohibition of fencing, and efforts to handle their stock through this means had often resulted in prosecutions for violation of the fence laws. That the proper handling of cattle and horses requires the construction of fences in certain localities is recognized by all. Therefore, it was with much gratification that the stockmen learned of the willingness of the Forest Service not only to allow the fencing which was so much needed, but to cooperate with them in the construction of such improvements. This has reduced the losses from straying and theft, but most



MOVING A CAMP OF GRAZING EXAMINERS IN ACCESSIBLE AREAS.

important of all has enabled the stockmen to successfully raise higher grade stock and to get larger calf crops. The construction of fences has also been an important factor in preventing the spread of disease and reducing the losses from poisonous plants.

Early in the administration of the Forests it was found that pastures were needed for holding stock which was being gathered for transfer to other ranges or for shipment to market and provision was made to meet this need. The pasture privilege was afterwards extended to include pastures for saddle horses and pure bred or graded stock and to give settlers a way of holding a limited amount of winter range adjacent to their ranches. This regulation has been taken advantage of very generally and the large number of pastures which have been built under it show in another way the advantages of a proper control in the use of the range.

DEVELOPMENT OF WATER FACILITIES

Next to grass the most important need of livestock is water. It was found that much could be done in the way of improving the stock watering facilities on the National Forests and right in the beginning we started cleaning out the seeps and springs, piping

the water into troughs, building reservoirs and doing whatever else might help to increase or secure a better use of the water supply. During 1912 a report was secured from each Forest, covering the water development work done since the Forests were put under administration. The figures secured show 676 water-development projects to the close of 1912. Of these, 173 were developed exclusively by the Forest Service, and as many more in cooperation with permittees; and 320 solely by the stockmen.

Complete figures are not available as to the new acreage of range brought into utilization by this water development. In Arizona and New Mexico alone, however, 65,000 acres of new range have been made available by water projects developed by the Forest Service in cooperation with the stockmen, and 420,000 acres made available by projects developed by permittees—a total of 485,000 acres of new range by water development in these two States alone. A great deal of water development done by the Forest Service has been to secure better management of range already in use, which accounts for the small acreage of new range brought into use by water development. While the acreage developed by the stockmen

is large, this improvement may be attributed almost wholly to the Forest Service putting the grazing on a substantial basis and assisting and encouraging permittees to develop water.

There is still a great possibility for improvement along this line. On the Pecos Forest there are 90,000 acres, which would carry 5,000 cattle or 20,000 sheep, now unused, due to the lack of water, and that could be largely developed by four dams costing \$1,000 each. On the Tusayan Forest there are 200,000 acres not fully utilized which would carry 1,000 more cattle if properly watered. The Sundance Forest has 2,100 acres which were made available by developing four springs in 1913, and plans have been made for developing 20 springs in 1914. A great many of the Forests will show similar work in development accomplished and possible development in the future.

RESEEDING THE RANGE.

Let me now tell you something of what has been done in the way of reseeding the ranges. In 1907 experiments in seeding range to cultivated forage plants were initiated. To date something over 500 experiments, covering 86 Forests, have been initiated. From these tests it has been learned that artificial reseeding can be accomplished economically only on mountain meadow areas of good soil, and alluvial bottoms along creeks, at an altitude of

not higher than within 500 to 1,000 feet of timber line; also that on these areas timothy is ordinarily the best species and that one year's protection from grazing is necessary after seeding.

The work under way on artificial reseeding this year and that planned, is to establish more definitely the economic possibility of improving our better soils by reseeding and possibly by irrigation. A number of observations and reports this year show that at a very small cost for diverting the water at the heads of meadows and scattering it out over the area, then seeding the area to timothy, the forage crop has been increased from 100 to 400 per cent, in many cases beyond the cost of the labor.

PROPER USE, BEST METHOD OF IMPROVEMENT.

This method of procedure, however, is both slow and expensive and the greater part of our range lands must be improved by protection and natural reseeding—at least within the next 20 years—until we know more about artificial reseeding. Our investigations have established beyond doubt that natural reseeding can be accomplished best by a rotation system of grazing, based upon the simple principle that after the vegetation has matured its seed, approximately from August 15 to September 15, grazing aids in scattering and planting seed. A report recently received from the Supervisor of the



A MOUNTAIN MEADOW SURROUNDED BY DENSE STAND OF RED FIR, AND WATERED BY A WINDING BROOK.



MANY DENUDED SLOPES OCCUR IN THE JEFFREY PINE TYPE, IN THE CENTRAL SIERRA NEVADAS.

Hayden Forest on the experiment started there in 1910 with one acre absolutely protected yearlong against grazing, 19 acres protected until after seed maturity and then grazed, and outside range unprotected, shows that the vegetation on the 19-acre tract grazed each fall is approximately 50 per cent better than the totally protected area and probably 200 per cent better than the range without protection. This means that the ranges can be improved faster in use than they can be in idleness. This principle is being rapidly adopted on many of the other Forests and is securing excellent results. In my estimation this system offers great encouragement in range improvement, for the reason that there is almost no waste of forage and consequently the stockmen suffer no loss in adopting it. It gives better results than total exclusion of the stock and it prevents the accumulation of coarse, unusable forage, and other inflammable material which is a menace to the Forests. This principle can be worked into the management of every piece of range on National Forests and will be fundamental as long as we have range management.

THE NEW OPEN SYSTEM OF HANDLING SHEEP

Our experimental work in methods of handling stock has been confined mainly

to sheep. Byfar the most important phase of this work has been the development and practical application of what is known as the "Blanket system," "Bedding out system," or "New method" of handling sheep, which is simply open, quiet herding during the day and bedding the sheep where night overtakes them. We started a vigorous campaign for the adoption of this change in the handling of sheep in 1909, based largely upon the result of the Coyote-proof pasture experiments in the Wallowa National Forest, Oregon. At that time this method of necessity was largely employed in the Southwest and elsewhere by a few of the most successful sheep companies—such as Woods Livestock Company. Aside from these cases, most of the sheep were handled under a system of returning to the same bed ground as many times as the Forest Service would allow, which in a great many instances was more than the six nights provided by the Regulations.

At the present time there are a number of Forests where almost without exception the sheep are never returned to one bed ground more than one or two nights, and on nearly all the grazing Forests, at least a part of the sheepmen have been persuaded to adopt this method, and the result invariably is an average increase of about 5 pounds in the weight of the lambs, and I should



OPEN WOODLAND TYPE.
THE BARE ROCK PINNACLES IN BACKGROUND MAKE FIELD EXAMINATION OF THE GRAZING EXAMINERS DIFFICULT.

say an increase of 10 to 25 per cent in the carrying capacity of the ranges. An increase of 5 pounds per lamb for 5,000,000 lambs would mean 25,000,000 pounds added to the sheepmen's salable product and the country's meat supply.

THE CASE OF THE MADISON FOREST.

The best example of what has been accomplished in the way of adopting this system is perhaps the Madison Forest. With perhaps one or two minor exceptions the sheep on this Forest are handled without returning to one camp more than two nights. In 1912 the Supervisor submitted figures and statements from sheepmen showing that the advantage of this method over the old method of returning to bed grounds was from 5 to 15 pounds difference in the lambs, with a corresponding difference in the condition of the ewes. Sheepmen established this advantage to be from 20 cents to 50 cents a head on the sheep. In 1913 we planned to get an experimental comparison of sheep handled under the new system and sheep handled under the old system on the Madison Forest. When the test came the Supervisor could not get any permittee to return to the old system for experimental purposes without paying a bonus

of 50 cents a head. One permittee finally consented to return to the old system provided he were allowed 100 head of sheep free of charge in addition to his permit. A total of seven bands were carefully observed during the season, the acreage of range used by each band was mapped and compared, and lambs in each band were weighed and marked at the beginning of the season and again weighed at the close of the season to determine growth. The average gain per day of the lambs under the new system was .43 pounds as compared with .38 pounds made by lambs under the old system, a net gain of .05 per day per head in favor of the new system. At 5 cents a pound this difference amounted to $22\frac{1}{2}$ cents per head for a period of 90 days. On a band of sheep containing 1,000 lambs, therefore, it would amount to \$225 during the grazing season of 90 days; in addition the difference in condition of the lambs would probably result in a higher price for the better lambs raised under the new system.

This change in method of handling has been, in large part, responsible for the building up of the Madison Forest and enabling us to increase the number of sheep grazed from 90,000 head to 107,-



DEEP CANYON SHOWING ROCKY CLIFFS.

AN IMPORTANT FACTOR IN INCREASING COSTS OF MOVING CAMP AND OF FIELD EXAMINATION BY THE GRAZING EXAMINERS.

000 head, with a possible further increase of several thousand head.

There has been some difficulty in getting the herders to adopt this new system for the reason that it means harder work, but experience has shown that after the sheep get used to the open system of herding they are no harder to handle than under the close herding system. All good herders take a pride in having their sheep look well and there is often the keenest kind of competition among them in getting their herd on to the best bedding ground. As such herders come to realize that it means better sheep they voluntarily adopt the open herding system out of pride in securing the best possible results.

OTHER INVESTIGATIONS.

The Forest Service is carrying on many other studies and experiments with a view to helping the stockmen secure a better utilization of the forage resources of the National Forests and to raise more and better stock. In 1911

a systematic range reconnaissance was begun to learn the exact proportion of the Forest land which was suitable for grazing and to find out the character of the different ranges; the kinds of grasses and plants growing in each locality; the kind of stock to which they were best adapted; and in fact, to get all of the information which would be of value in promoting the fullest possible use of the lands. Over 5,000,000 acres have already been covered by this survey. Aside from the actual acreage covered this work has accomplished something even greater by starting systematic, intelligent study and classification of the ranges on practically all of the grazing Forests. The result will be more equitable distribution of range between permittees, improvement in management of the stock, utilization of unused range and intelligent development of the range lands to their highest use. The success which we have had in all this work has been due largely to the hearty cooperation of the stockmen.

[American Forestry is indebted to the Forest Club Annual of the University of Nebraska for the cuts illustrating this article.]

WOODLOT FORESTRY

For the Instruction of Owners of Farms and Country Estates

By R. ROSENBLUTH, M. F.,

Director of Forest Investigations New York State Conservation Commission

THE woodlots of the farms and country estates have, for the most part, been treated with *mistreatment*.

Neglect and abuse have been the keynotes by which the owners have been guided in managing this valuable resource. Even the progressive farmers of the country who pride themselves on crop rotation, intensive methods, alertness and business on the rest of their farm, are following the old careless, if not ruinous, methods in their woodlots.

While the percentage of improved land on the farms has remained about the same from 1880 to the present, the amount of unimproved land has more than doubled and the woodlots have decreased about one-third—in other words, not only have the woodlots themselves deteriorated in condition, but a large area has been actually destroyed and made worthless, nonproductive land.

To point out the importance and value of the woodlots to the nation and the individual owners; to stimulate the owners to the practice of forestry in their woodlots, securing for themselves and to the nation the many benefits and great profits which well-managed woodlands yield; and to point out clearly and simply the principles and methods of correct forest practice—these are the aims of this bulletin.

IMPORTANCE OF WOODLOTS.

The woodlots of the nation represent, in the aggregate, an enormous source of natural wealth.

Statistic show that of the 1,903,289,600 acres net land area in this country, 878,798,325 acres are in farms. Of this farm area we find:

478,451,750 acres (54.4%) improved land.

190,865,553 acres (21.7%) woodlots.

209,481,022 acres (23.8%) unimproved land.

878,798,325 acres (100%) in farms.

Studies show a conservative estimate of the amount of unimproved land in farms, which is best suited to forest productions, to be at least 70,000,000 acres; which, in connection with the area now in woodland, makes a total of 261,000,000 acres, or 30 per cent of the land holdings in farms best adapted to forest growth. This total area is held in comparatively small holdings, on which all necessary work can be done by the permanent labor force at times when it cannot be otherwise profitably employed.

Conditions thus are ideal for intensive management of this great forest area.

At present it represents one of the least intelligently used assets of the nation.

The total value of the forest product of farms is \$195,306,283, or roughly \$1.00 per year per acre of farm woodlot.

Under intelligent and intensive management the owners should earn from these areas a fair share of the farm revenue, where now they produce almost nothing. This profit in money value should net about \$500,000,000 a year and produce for the industries of the nation between seventy-five and eighty billion board feet of lumber each year.

To the owner, the value of this woodland is made up of many factors.

The most common products are lumber, poles, ties, fence posts and firewood. Besides these, many special uses may be had in different localities, such as pulpwood, implement wood, etc. There are also many special products which may be developed—thus, gathering seed of desirable species often will yield a good profit. The value of these products is sufficient, under good manage-



FORESTRY AND THE FARM
WELL-LOCATED WINDBREAKS FOR THE BUILDINGS, AND WOODELOTS ON THE HILLOPS, WHERE THE SOIL IS POOR AND CULTIVATION DIFFICULT



TYPICAL WOODLOT

RESULT OF SUCCESSFUL CULLINGS OF THE BEST REMAINING TREES AT EACH CUTTING, AND GENERAL NEGLECT. OLD TREES OF INFERIOR GRADES, AND NO VALUABLE YOUNG GROWTH COMING IN.

ment and under average farm conditions, to provide a fair net return from the lands, and make the woodlot areas pay their fair share in the farm profits.

Unquestionably one of the biggest problems on the farms today is to secure and keep good help. This can generally only be done where year-around work is given; and the woodlot offers one of the most satisfactory solutions of the problems.

A belt of woods has proved of great value in protection against the direct mechanical effect of winds (blowing down of crops, especially fruit; shifting sands); against drying of soil; to a lesser extent in securing an even distribution of protective snow cover, and shelter after the snow has melted, for winter crops; and in very greatly increased comfort to people and stock. This spells increased profits in better and larger crops; and last, but not least, in greater comfort in the home.

It is a well-established principle now in successful farming, not to have "all the eggs in one basket." The wood crop is one which always has a market at a fair price; and with the price of the product constantly advancing. It can

truly be called a winter crop, as the cultivation (improvement cuttings, planting, etc. can be done at times not required by any other crop.

The woodlot may be compared to a high class bond investment, and is better than such investment. Good sized thrifty material of desirable species is always marketable at a fair price, earning a fair rate (4 per cent. or more) of compound interest all the time by its growth in volume; in addition, it is growing in value, both through increasing prices of wood products, and because material from larger trees is more valuable than that from smaller trees. After some calamity, such as barns burning, or crop failure, it can then be utilized when most needed; or, for example, during a coal strike, when other sources of fuel cannot be had, except at exorbitant prices and with great inconvenience.

Nearly every farm has some land which cannot be profitably used for farming crops. This may be stony, rocky land, wet land which cannot be drained, pure sands, steep slopes, especially if subject to excessive erosion (washing away), etc. Frequently, be-



THE WOODLOT AS IT SHOULD BE

GROUND FULLY OCCUPIED BY THRIFTY, VALUABLE TREES. CUTTINGS MADE TO IMPROVE THE REMAINING STAND, AND TO SECURE A NEW STAND OF THE BEST KINDS. YOUNG GROWTH ALREADY STARTED

cause of irregularities in boundary lines, a considerable amount of land cannot be used without undue expense in extra fencing, etc. Again, many times, because of labor conditions, a piece of land which might otherwise be used for pasture or crops, is not needed, and could profitably be used for tree growth.

The aesthetic value is a factor which cannot be accurately measured in its value to a place. Certainly it is considerable. For example, on a country place the difference between attractive woods and scrubby worthless brush or waste places would be enough to make a great difference in the value attached to the whole place; and for purposes of sale, an attractive place could be disposed of very much more easily than an unattractive one. In fact, an attractive grove of trees might often be the determining factor in a sale.

Or, if one goes to buy a farm and sees a piece of poor brush land or waste land his estimate of the value of the whole place is much lowered; if that same piece is covered with a well-set thrifty grove, even if young, his estimate of the value is raised.

PROTECTION TO WATER SUPPLY.

Around springs a piece of woods is one of the best means of providing against their drying up. In country places where a large and abundant supply of pure water is desired, the maintenance of woodland around the source of supply is a very valuable means of conserving it.

As a special problem, the value of woods on village, town and city watersheds is especially great. In such cases a considerable area of land must generally be held anyway to protect the purity of the water supply. This purpose can best be advanced by the maintenance of a good forest cover on the land, which will also prevent the silting up of the reservoirs, and irregularities in supply; at the same time yielding a profit from the use of the land.

There are still other uses which are hard to classify. Thus, it is well known that in keeping insect attacks on valuable farm crops under control, insectivorous birds, etc., are of great value. These always are able to thrive better when woodlots are at hand, in which to nest and seek shelter.

COSTS AND PROFITS.

In casting up accounts of the woodlot, it is seen that many factors, other than mere cash profits from the products derived, must be considered. At the same time, it is well to know just what financial return can be expected.

Unfortunately on this point there is lack of accurate data for the whole nation. The following examples will illustrate the possibilities:

In Western New York, a woodlot was heavily culled of most of its merchantable material in the past two years. There was left, however, about 202 valuable trees per acre on this portion, besides 146 trees which would best be removed to improve the stand. Most of the valuable species were hickory, white oak, red oak and white pine. At the rate of growth, as determined by measurements, and at average present market prices, in twenty years from now there would be value produced sufficient to earn the equivalent of a net annual income of \$3.27 per acre at 5 per cent. compound interest; figured for forty years ahead, the net return would be \$3.31 per acre per year, because of the more valuable material produced from larger trees.

This is disregarding the fact that at the end of these periods, timber prices are sure to be much higher than now, and also the fact that this stand is not fully stocked with valuable species.

An interesting and typical condition also presented here, in the possibilities of improvement of the stand, is that if the owner were to cut the 146 trees which ought to be removed, together with some good material on the ground, he would secure about $3\frac{1}{2}$ cords of wood, worth much more than the cost of planting a sufficient number of desirable trees, so as to secure a *full* stand of valuable species, and thus greatly increase the net profit per acre.

As another example, a farmer, realizing the value of his woodlot, has continuously improved it for the past twelve years, and today it is one of the most valuable parts of the farm. It has supplied fuel, fence posts, lumber for farm buildings and for repairs, and some has been sold. The work con-

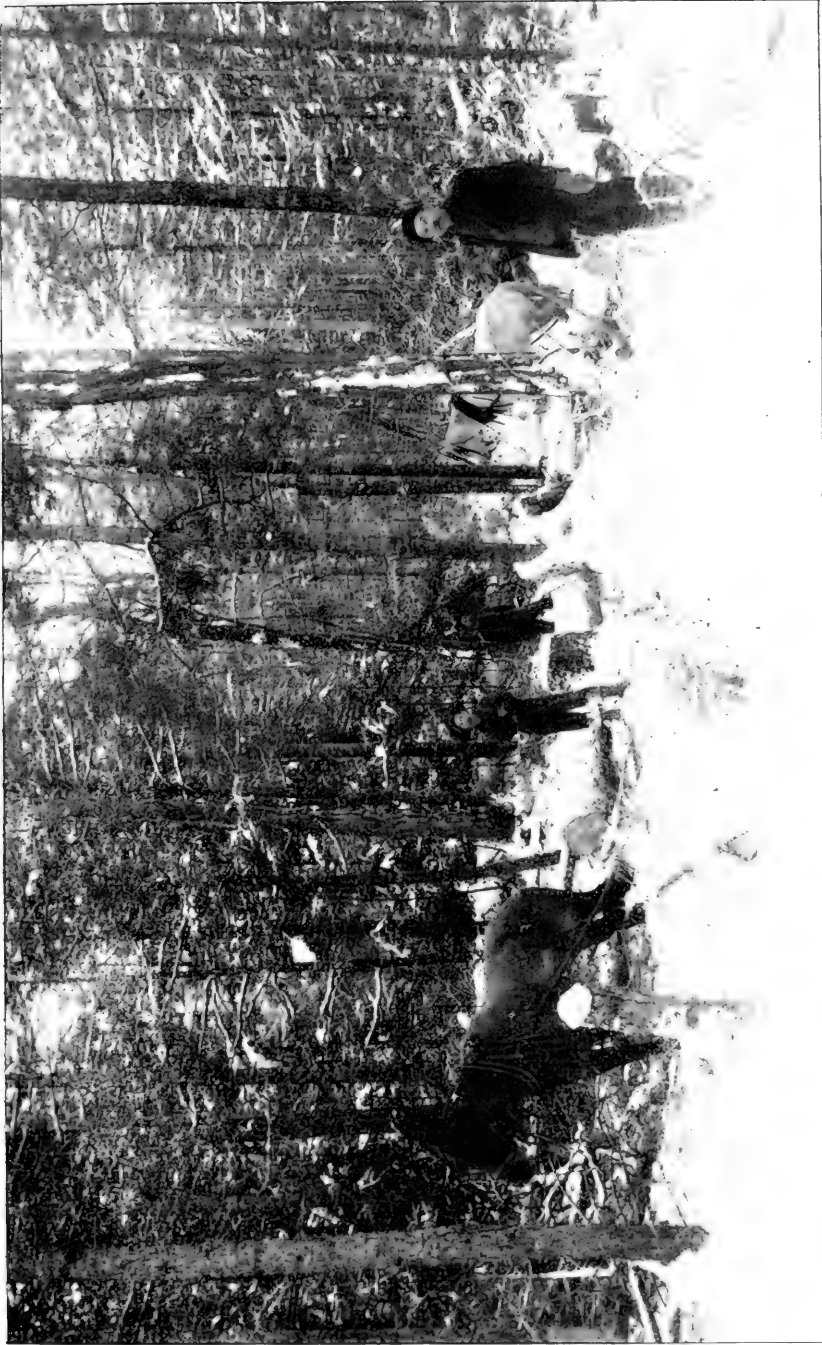
nected with its management was done in the winter and at odd times. The improved woods are now worth over \$150 per acre.

These examples are based on lumber sold under present market prices of stumpage or round logs. To the farm and country estate, the chief value of the woodlot is to supply lumber, posts and fuel, at least in times of emergency. The purchase price of these materials is generally very much greater than is received for material sold; and used as a source of home supply, the woodlot would yield much greater financial profit than indicated above.

Again, it is worth while remembering that the direct value of products derived is but one of many benefits derived from the woodlot; and it is especially urged, in view of the common misconception of the subject, that the income from better management is *not* something which will be enjoyed only by our great grandchildren, who, as one wag said, "Never did anything for us;" but is constant, with financial returns comparable at least to those from a high-class bond investment.

WOODLOT HISTORY.

In the development of the woodlot, we must turn back and consider the conditions under which they developed. When the first settlers came here, they found an almost unbroken wilderness. The forest had to be destroyed to clear land for agriculture. It had no value—in fact, it was considered an impediment. With that attitude, there was no effort made either to protect the forest from fire or other damage. Similarly, in the use of wood—at first only the very best trees of the best species would be taken for any purpose. With the gradual culling of the woods, we have today woodlots consisting mostly of culls or inferior stock. Most of the hardwoods are either the third or fourth set of sprouts from the same stump, and thus of very low vitality, or are seedlings of poorer species; the evergreens are, of course, of seedling stock, but the proportion of these is very much lowered, and these generally also are of weakened vitality. In addition, prac-



THE WOODS A WINTER CROP.

tically all the woodlots are damaged by fire, grazing, poor conditions for growth, often by insects or disease, so that today practically no woodlot is as thrifty as it should be. When the good farm land was cleared, then the poorer lands were attacked, and this continued, until today we find thousands of acres which, being best adapted to forest growth, should never have been cleared.

On the other hand, wet lands, a little difficult to handle because in need of draining, were mostly left uncleared, and frequently we find the best land on the farms under woods. Nor was any notice taken of the value of woods for windbreaks, etc.

So there is no fixed relation between the actual location of the woodlot and the location which would give the fullest possible benefits of an equal area of woodlot on the farm.

Now, all these conditions have changed. It is certain that intelligent and careful management of land, best adapted for the woodlot, will prove a profitable investment. This investment will generally consist of time and labor, which otherwise would be less profitably employed or else would lie idle (winter work); and in the foregoing of certain present cash returns when trees, which might be sold, are left to grow; and to a limited extent, in actual outlay of money, for trees to plant, in marking trees for cutting, or in other extra work in woodlot improvement.

A PROGRAM OF MANAGEMENT.

What is practical in forestry for the ordinary farm or estate in any given case must, of course, depend on the specific conditions involved. In general, the application of management will be in about this order:

(1.) Protection, principally against fire, often against grazing; and to a lesser extent, against diseases and insect attacks. Protection is closely connected with

(2.) Damage cuttings of waste material on the ground, dead or dying trees, etc., which make the worst fire traps, and breeding places for diseases. This, in nearly every case, can be done at a profit, as the material yielded will pay for the labor.

(3.) Avoiding Waste. In this connection may be mentioned the use of better and more careful methods in the woods:—cutting low stumps; working up all material in tops and limbs; working everything into its most profitable form; taking care not to injure remaining trees when cutting or hauling in the woods, etc. All this is closely connected with

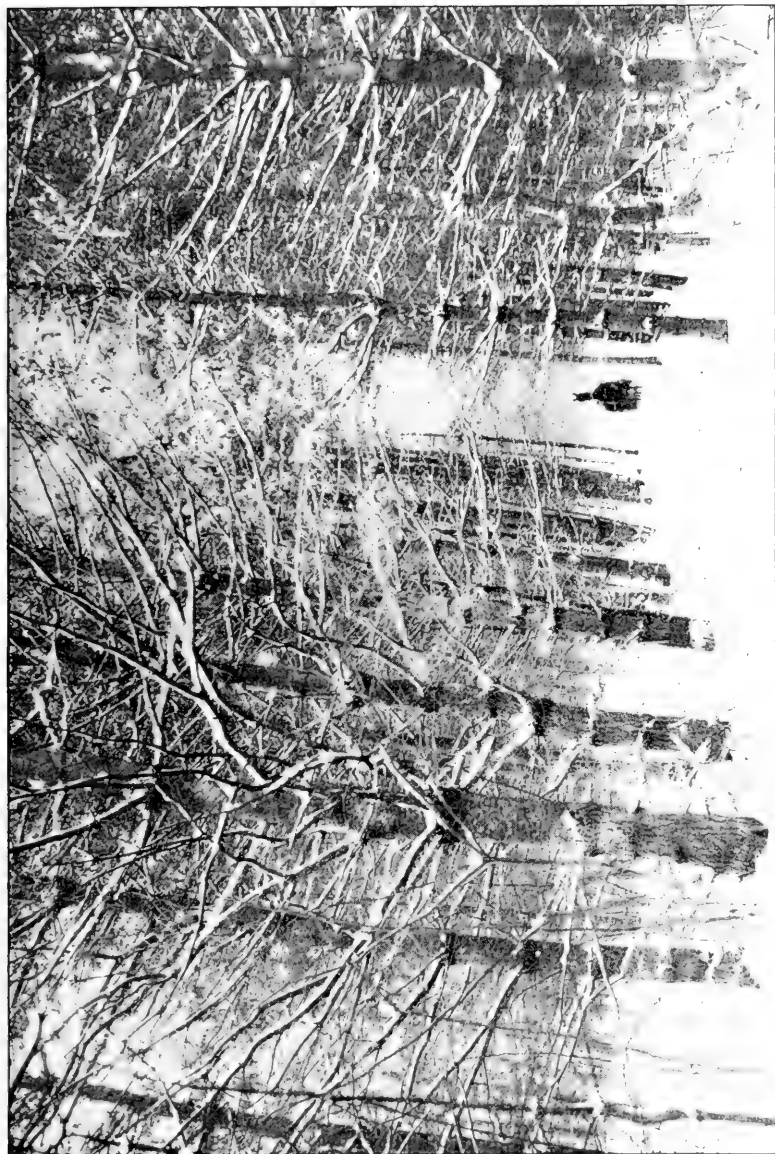
(4.) Cuttings made of standing timber, in such a way as to improve conditions. While to be discussed more in detail under the subject of management, these are broadly divided into (1) improvement cuttings, in which the principal aim is the removal of those trees which should be cut for the benefit of the remaining stand; and (2) reproduction cuttings, in which the main idea is to secure a new crop from seed of the most desirable species.

(5.) Planting or sowing either on the open waste places; or in existing woodlots, where these are too open, or where they contain too great a proportion of inferior species; or for windbreak or aesthetic effects, etc. Planting is very closely related to the relocation or change in area of the woodlot, where necessary to secure the best results from a given area of woodlot—that is, where the sum total of all the factors of value, as enumerated previously, is the greatest.

(6.) A plan of regulating the cut may be to secure a certain amount of material of given quality and size every year, or at regular periods. A plan for an equal annual cut is rarely practicable in ordinary woodlots, as now found, because the area under management is too small and its condition too poor. However, it is practicable to aim for an annual cut not to exceed the annual growth; or for a cut less than the annual growth, accumulating a reserve fund for larger timbers to be cut at more or less definite intervals. Where possible, this involves a definite system of forest management.

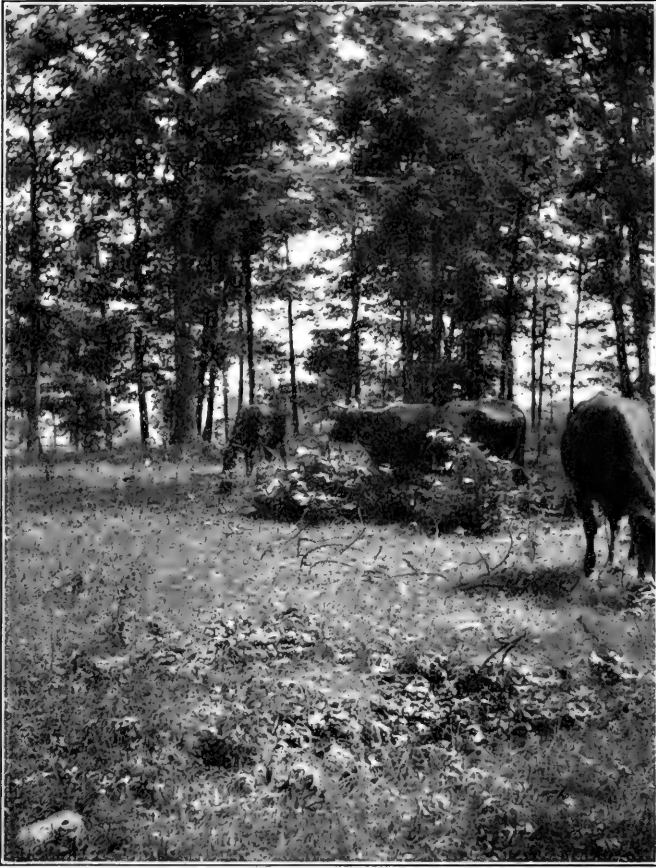
FACTORS OF GROWTH.

All tree growth, like other vegetation is governed by the environment in which found. This is true of individual trees, of species, and of types or com-



SECOND GROWTH OF WHITE PINE FROM WIND-SOWN SEED. TREES ARE TOO FAR APART TO SHED THEIR LOWER BRANCHES NATURALLY

Photo by A. Knechtel



HERE THE WOODLOT IS BEING USED FOR GRAZING—BUT THIS PREVENTS REPRODUCTION, THE COWS DESTROYING THE YOUNG TREES

munities. To be successful in forest management, the practice must conform to the conditions and full advantage must be taken of the factors of growth which control in any given situation.

These factors fall into two great groups, not however, clearly defined. These may be termed the "Natural" factors, including only the broad features closely related to climate, etc. over which man has but little control, and the "Subsequent" factors, brought about mainly by man himself, or through changes which he has wrought.

Briefly, the great natural factors of growth are: Moisture, heat, light, soil, slope, aspect and wind.

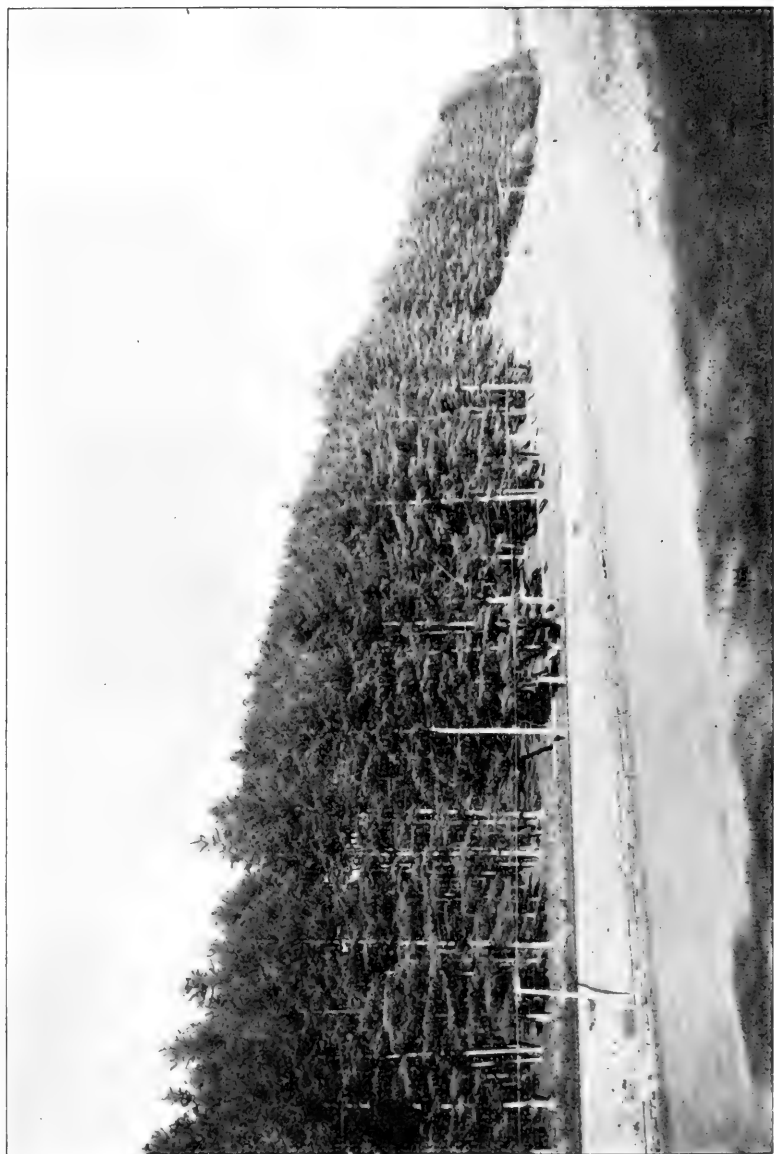
Moisture is a most important factor in tree growth. Without moisture trees cannot grow. But different trees differ

widely in their demands for moisture, and only those trees adapted to the moisture conditions should be used in a given situation. For instance, the red pine can grow on very dry sites, while the black ash must have moist ones.

However, it is the minimum amount of moisture which any tree must have that is most important. Up to a rather high per cent. of moisture, such as in permanently soggy ground or in swamps, almost any tree can do better, the greater the amount of moisture it has.

Therefore, in forest management, it is important not only to use species adapted to the general moisture condition, but to use such practices as will conserve and improve the moisture factor.

As a genreal proposition, the woods



WHITE PINE GROVE—SARANAC LAKE VILLAGE. LONG CLEAN TRUNKS DUE TO DENSITY OF STAND

and waste lands of the farms are either the driest or the wettest ones.

On the dry situations, the best practice requires the keeping of a good forest cover, sufficiently dense to prevent drying out of the soil by sun and wind.

On the very wet situations, frequently much can be done to improve moisture conditions by a small amount of ditching which can now be done economically by the use of dynamite. Often, land which is called too wet and cold and now left to grow to worthless scrub, with proper drainage can be turned into the most fertile part of the farm. Again, there are opportunities on such land for special crops, such as basket willow. If left in ordinary woodland much can be done by laying special emphasis on selection of species best adapted to the particular site, perhaps supplemented by some simple ditching.

For each locality the relationship of trees to drought and soil moisture should be noted, and only those species used which are adaptable to the conditions of soil and air moisture prevailing over the area.

Heat is one of the chief factors in the distribution of trees. Thus, the forests of the north are of different species and types from those of the south. It is necessary to know the requirements of trees with respect to heat in order to determine whether they can be used or not. It is especially important to know the susceptibility of any given species to late and early frosts. Thus, the catalpa, widely heralded as a most valuable tree, is not adaptable over most of New York, being too frost-sensitive. Again, certain species, although they will be able to live under the lower temperatures and shorter seasons of Northern New York, or in the mountains, grow so slowly as to be undesirable, while in warmer districts their growth is rapid enough to make them valuable.

Beyond this choice of suitable species, we have little control over the factor of heat. The indirect effect of heat, such as the drying out of the soil, can be obviated, but this really is directly an effect of moisture conditions.

Minor influences of heat, such as sensitiveness to frost-cracks, can to a certain extent be controlled by regulating the density of the stand, etc.; in forest practice, trees which are especially susceptible to such injury should not be unduly exposed but maintained in more closed groups.

Light also is one of the major factors of growth. From a forestry standpoint, it is, with moisture, the most important, because these two are the ones most susceptible to control by forestry methods, and show the greatest difference in returns following proper methods in contrast to improper methods.

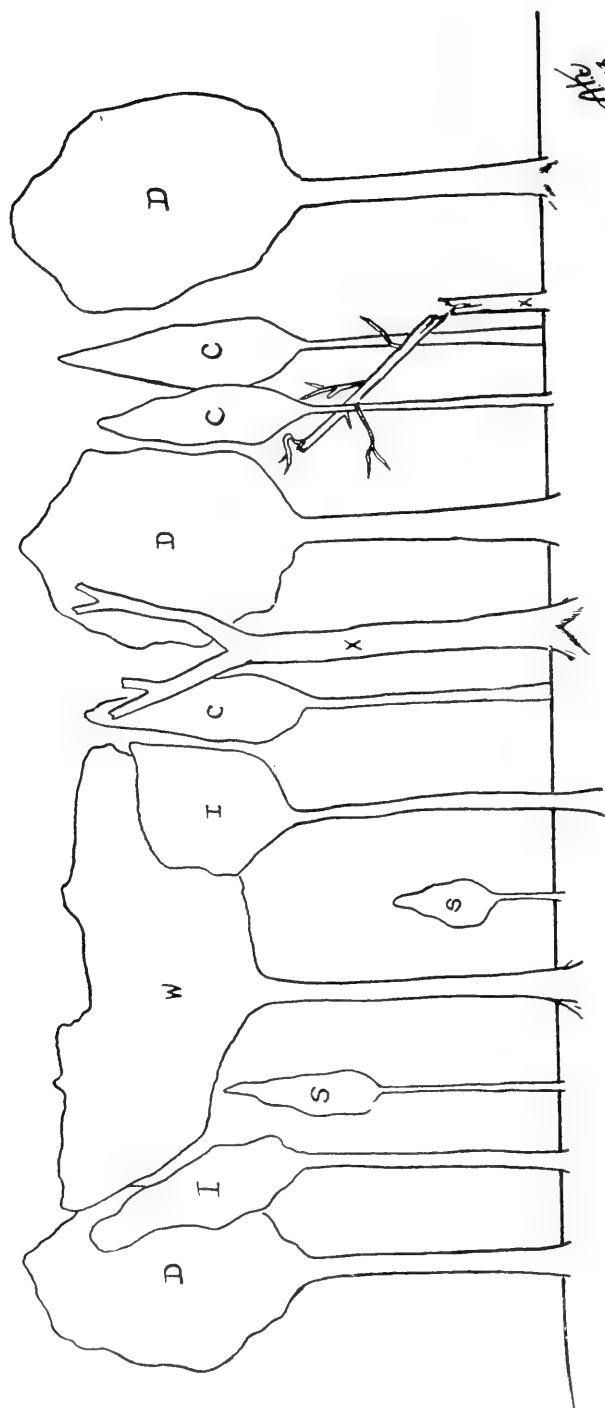
Light is absolutely essential to tree growth, as it is this that causes the inorganic plant foods taken from the soil and air to be assimilated by the leaves into higher forms, available for tree growth. Thus, one of the most noticeable facts in growth is the relation of any tree to the condition of light in which it can, and does grow.

Thus, a tree in the open may have its branches low and spreading; while the same species, grown in a dense forest, will have a long, straight clean trunk, with living branches only on the upper portions. This is true, because in the open, the total necessary leaf surface can be most easily obtained by spreading the branches laterally, while in the forest it becomes necessary to keep the crown well up with the rest, in order to get light for the leaves. At the same time, the lower branches, deprived of light, die and eventually fall off, leaving the clean trunk of a forest tree.

In relation to the development and position of the crown or head, of a tree, that part from the lowest large living limb to the top, with respect to the stand in which it is found, a tree is divided into one of four classes:

(1.) Dominant, with full crown and sufficient growing room to the sides, as well as free light from above. When spreading, and shading much more land than it should, the tree is termed a "wolf tree."

(2.) Co-dominant: Trees just a little below the dominant trees in height, with free light from above but crowded from the sides; not entirely free, nor with full crowns.



I—INTERMEDIATE TREES
 S—SUPPRESSED TREES
 X—DEAD TREES

W—WOLF TREES
 D—DOMINANT TREES
 C—CODOMINANT TREES

(3.) Intermediate: Healthy trees, but far enough below the normal so as to be shaded from above as well as on the sides. Such trees are still thrifty, and usually capable of making full growth if given enough light.

(4.) Suppressed: Those so far behind and completely shaded that the crown development is not much more than enough to keep the tree alive. Such trees may, or may not, recover full vigor if given enough light, depending mostly on the species and the degree of suppression. As a rule, even if recovery is possible, it will be years before full vigor is regained.

A fifth class, of "dead" trees, is sometimes included.

Again, different kinds of trees differ very much in their demands for light. Spruce can stand a very large amount of shading, and does not do well in the open; while the Scotch pine demands a great amount of light, and can stand very little, if any, shading. Trees which can stand a considerable amount of shade are called tolerant, those that demand much light and cannot endure shade are called intolerant.

Also, individual trees differ at different periods of their life with regard to their light relations. Most trees can stand at least a moderate degree of shade at the start, and generally demand an increasing amount of light as they grow older.

The demand for light also varies with the situation and district in which the tree is growing.

It is thus important to know the light requirements, not only of the different species, but also at different periods in the life of these species.

Proper forestry methods aim, as far as practicable, to assure enough light to the best individuals of the best species, so as to allow them to make their best growth, and at the same to maintain the stand dense enough to produce good, tall, clean trunks.

There is also an intimate relationship between light and maintenance of the quality of soil, and such features as the seed-bearing qualities of the tree.

As with moisture, so with light, a study must be made in each locality of

the tolerance of shade by different species, and the forest management must be very largely based on the needs of the trees favored.

As with all other plant growth, the kind of soil affects very largely the kind of tree growth found on it, and the quality of that growth. Thus, the red pine can grow on the poorest of sands, while the basswood must have a rich soil.

Any tree will do better on a good soil than on a poor one. But we must not use a tree which requires a good soil on soil of inferior quality.

Just as in farming, good methods maintain and improve the qualities of a soil, while poor methods—the ordinary kind—impoverish the soil, so it is with forestry. The leaves and other decaying vegetable matter add very much to the richness of the soil, forming a good humus and leaf mold. But if exposed to too much light and heat, this humus does not form from the leaves and their nourishment is wasted. So one of the guides to proper forest practice is to maintain such a cover as will improve the soil conditions. This is generally accomplished by maintaining, as nearly as possible, a complete shade for the ground.

At times when reproduction by seed from standing trees is desired, however sufficient light must be given to do away with the litter, and thus provide better seed-bed conditions.

The requirements of trees with regard to soil must also be studied, and only those species used which are adapted to the quality of soil on the site on which grown.

The *Species* itself has much to do with the rate of growth. Certain species, as hemlock, or native red spruce, are naturally very slow growers, while others, as Carolina poplar, are naturally very rapid growers. Of course, all species will grow better on good soils than on poor ones; and under proper forestry methods will grow much better than under poor methods. At the same time, it is important, other things being equal, to favor the most rapid growing species. Thus, generally, red oak should be favored over white oak, as it

grows so much faster; while the native spruce and hemlock grow so slowly that it is not best to favor them in the ordinary woodlot.

Knowledge of the rate of growth is especially valuable in choosing trees for planting, as naturally slow growers would not produce enough to pay interest on the money invested.

While moisture, heat, light, and soil comprise the four great elements affecting growth, and the character of the species itself is very important, even in the same district, these factors are subject to many variations.

The steepness of the slope is an important factor, greatly modifying the factors of light and moisture.

The aspect (the direction in which the slope faces, as east or west) is important, in modifying especially the factors of heat and moisture, and to a certain extent, of light. Thus, a south slope, which becomes heated sooner in the spring, is very much more apt to have growth start earlier, and this growth is more likely to be "nipped" by a late frost, which is general over the whole district, than would be the case on a north slope. A south slope dries out more than a north one. And as between south and north slopes, so between west and east ones; and on a ridge running northwest to southeast, for instance, the northeast slopes might have very different conditions of growth than the southwest ones.

Wind is another factor, acting to a small degree in modifying the forms of trees, but much more important from its modification of the factor of moisture, and still more so in its mechanical effects, in blowing down trees.

In modifying the form of trees, this is apparent mostly on exposed mountain peaks, along the shore, etc., where a dwarfed, bushy form is developed, best to resist the winds.

To prevent drying out of soils, a dense border at the edge of the woods should be maintained.

Should the border of the woods be open, it will be best to plant several rows of such trees as Norway spruce to act as a windbreak.

The mechanical effect of wind—that

is the blowing over of trees in the forest—is its most important one. The resistance of different species, as well as of individuals grown under different conditions, is a consideration of importance in management.

Species must be so selected and managed that the danger of windfall is reduced to a minimum. Thus, a species like the spruce with its shallow root system, must be grown in closer stands, and in more protected places than the deep-rooted Scotch pine. Especially in cuttings in dense stands, where resistance to wind was provided by the whole woods, trees must not be left to stand too openly, as the danger from being blown over by wind is too great. This applies especially to shallow-rooted species like spruce. With them different forest practice must be adopted than that used with wind firm species.

So far we have discussed mainly the natural factors of growth. But much more important, generally, in their damaging effects, are the factors produced by man himself or by conditions which he causes. To a certain extent, of course, these damaging agents are entirely "natural" in their work, and not the result of man's work.

Most important is fire. Almost all of our woods have been seriously affected by fire.

The effects of fire are many, and often but little understood or noticed. Thus, the ordinary, light ground fire, which is not thought of as doing damage, burns up the leaf-litter and vegetable mold, which is so valuable in soil fertility. From this alone, the loss is enough to warrant great care in excluding fire. Then, if there is any seedling reproduction on the ground, this is generally killed off, so that desirable new stock cannot get established.

If the fire is a bit more severe, enough injury is done to the standing trees to check growth, or at least weaken the vitality of the trees. Generally a wound is produced through which disease or insects can enter and thus kill or seriously affect the tree. Frequently the young saplings and small poles are killed outright, and thus only mature trees past their prime are left standing.



THE COMPARISON OF NATURAL REPRODUCTION ON PASTURED AND UNPASTURED LAND TO THE RIGHT OF THE FENCE PASTURING HAS BEEN PROHIBITED, AND THERE IS AN EXCELLENT REPRODUCTION, WHILE ON THE LEFT PASTURING HAS BEEN PERMITTED AND NO YOUNG GROWTH IS TO BE FOUND

Photo by J. M. Stephen



EFFECTS OF LIGHT GROUND FIRE

These are generally injured so that their value is greatly decreased.

Last comes the fire severe enough to wipe out all the stand.

It is in one of four ways that fires do most of their damage in woodlot:

(1.) By burning up the litter and plant food, making the soil poorer.

(2.) By checking growth, and reducing vitality.

(3.) By injuring tree, so that either loss in quality of wood is effected; or wounds produced through which rot or insects can enter the tree.

(4.) By destroying new young growth, and generally of the best kinds. Thus, all evergreens seedlings may be wiped out, while the hardwoods, through their ability to produce sprouts, may survive; and the poorer species, as birch, increase at the expense of the better.

The principal causes of fire are railroads, brush burning, and carelessness. The question of protection from fire is discussed under Management. In general, however, different species differ considerably in their ability to withstand fire, and allowance for this should be made in the selection of species.

In woodlots it is the common prac-

tice to turn cattle or hogs into the woodlot to pasture. It is generally believed that this does no harm to the woodlot.

As a matter of fact, only in fairly mature woods does grazing do no damage; and in itself, the fact that there is any pasture there means that the woods are not in as good shape as they should be. If the woods were as dense as the best conditions demand, there would not be enough light on the ground to support a growth of grass, and the amount of pasture would not be sufficient to turn the cattle into the woods. Besides this, cattle browse off young trees and trample down others, and hogs root up many trees, while sheep are especially destructive to very young growth.

Only in special cases should the woods be pastured, such as turning in hogs to root up the ground just before the seed falls in a good seed year, thus making the seed bed conditions better.

As a general thing, a piece of land should be used *exclusively* either for woods or for pasture. Well managed for either use, the return will probably be greater than the combined use for both woods and pasture.

Each year the damage by forest

insects and tree diseases is becoming a more serious problem. Especially does the damage from these sources increase with trees weakened by fires, or grazing, or other causes, or in old over-mature trees.

Insects are divided into three classes as to mode of attack, namely, chewing, sucking and boring. From the forest standpoint for practical purposes, the two classes of borers and leaf feeders (chewing) are the most important.

The borers generally work by burrowing under the bark and feeding on the living "cambial" tissue between the wood and bark. Spreading out in secondary channels, these insects more or less girdle the tree, or parts of it, and either greatly weaken the vitality of the tree or kill it.

The leaf feeders, as their name indicates, injure the trees by more or less completely eating off the foliage, thus greatly checking growth and weakening the tree; and killing it if repeated over several years.

The insect enemies are so many, and so varied according to locality, that it is impossible to enumerate these here. Most states maintain entomologists from whom information concerning the insect pests of their states may be obtained.

Of the tree diseases not so much is known. Those that attack living trees generally work by feeding on the cambial layer just under the bark, and appropriating to themselves the nourishment which should go into the tree.

Many of these diseases have two stages and more than one form; that is, they may live part of their lives on a certain tree and part on another plant, and the form on the different hosts may be entirely different and not recognized except after careful study.

Thus, one of the most threatening diseases which has appeared in some

time has been the white pine blister rust. This disease lives in one form or young white pine and at other times in another form on the currant and gooseberry. Fortunately, the disease has so far been kept in check by destroying all the currant and gooseberry bushes near any infected localities—deprived of its alternate host, the disease cannot spread.

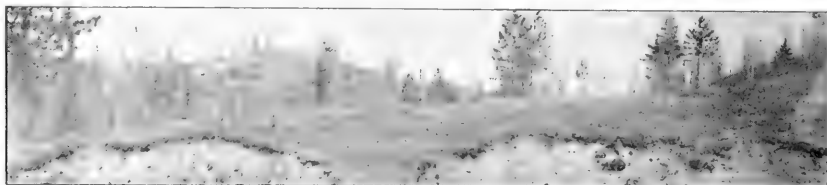
The chestnut blight is perhaps the most virulent tree disease which has ever appeared. No known remedy has yet been found, and the destruction of the chestnut seems imminent.

The liability of certain species to damage from these causes must be understood. Thus, the chestnut bark disease is so virulent in its attack on chestnut as to render it impracticable to favor chestnut as a tree in forest management. Similarly, in many cases the white pine weevil, hickory borer, elm leaf beetle, locust borer, and other insects make inadvisable the favoring of those species in certain localities and under certain conditions.

These must necessarily modify the forest practice, both in selection of species and especially in taking steps to see that the woods are as little liable to attack as possible. This generally means keeping the woods cleared of dead and diseased individuals, as these are the breeding places for the disease or insect. Another important and practicable thing is to protect and encourage the propagation of our insectivorous birds, etc., as these are very valuable in checking depredations.

Poisonous gases, such as produced by smelter works, often will kill all the tree growth in their vicinity. This is of very limited occurrence, however, and not often noted. About the only measure possible in such cases is to use the species most resistant to the poisons found.

(To be continued.)



WASTE LAND ON THE FARM

INITIATING A STATE FOREST POLICY IN KENTUCKY

By J. E. BARTON, State Forester

TO a man who undertakes the task of organizing a forest policy in any State, I feel certain a great many situations and circumstances which arise will come as a shock, especially if, heretofore, his earnest endeavors have been confined to private work, teaching or work in the federal Forest Service. There is a poem entitled, "In Kentucky," which contains these lines "Politics are the damdest in Kentucky," and the force of this statement with relation to the initiation of a forest policy in the State I have felt most keenly. By no means do I desire to give the impression that politics in Kentucky are worse or more in evidence than in any other State; but since I have been myself engaged in State work my observation here and elsewhere has been that the political exigencies of the State, the party, and the individual are the "form factor" of the situation as far as a State forest policy is concerned. An adequate preparation for the office of State Forester would involve, among other important features, a course in county politics and training for the diplomatic service. Then, if the receptive individual is long on suavity, patience and tact, he will probably hold his job through one administration and accomplish some effective work. The people of the South love politics and the Southerner is a born politician, which facts should be written in large letters in the mind of such persons as seek to initiate forest policies in the Southern States.

It is perfectly astonishing, when one considers the length of time during which there has been a concrete forest policy for the United States, the amount of literature that has been published in this country concerning forestry and conservation generally, the discussions, lectures and talks upon this subject that have been staged everywhere,

what a wide-spread ignorance with regard to forestry there is, even among educated and well-informed people. It is against this stone wall of ignorance that a State Forester is continually butting his head and for that reason one of the chief features of any policy he may initiate must be educational exposition of what he is trying to accomplish. He must talk and write Forestry continually and must take advantage of every opportunity to arouse an interest in forestry and conservation problems. In this connection, I have undertaken lectures at Farmers Institutes and meetings of diverse character; wherever, in fact, the opportunity presented itself. I have taken the matter up through Women's Clubs, the Boy Scouts, and through the Educational Department of the State. A plan is now under way to organize Boys' and Girls' Forestry Clubs throughout the State on the same general lines as Boys' Corn Clubs and Girls' Canning Clubs are organized by the United States Department of Agriculture. It seems to me that the hope of forestry in the State and in the United States lies in an intelligent understanding of the problem by the rising generations and that through the children a sense of the importance of the problem will be brought into a large number, if not the majority, of the homes within the commonwealth and the nation.

Of course, a wide dissemination of literature on forestry is desirable and this should be as timely and helpful in a practical way as it can be made if it is to count for anything in enhancing the value of a forest policy for the State. For instance, it has been my observation that one of the important problems for Kentucky (certainly in the Blue Grass Section and Western Kentucky) is the raising of fence post material. An exhaustive study of the species which



RAFTS OF OAK, ETC., ON BEACH OF RIVER NEAR ASHLAND, BOYD COUNTY, KENTUCKY

are suitable for fence posts, the results of which are published, is timely, but so far as regards black locust (one of the species which could be used) no study is complete without giving the farmer definite and practical instructions with regard to the control of the insect enemies of the black locust, notably the locust borer. Again it is unusual and striking features that stick in the mind of the average citizen and I am attempting to make use of this fact in getting together an exhibit at the State Fair this year. The idea is to present something novel and out of the ordinary which will attract attention. In this connection it may be stated that a forestry exhibit (or for that matter any kind of an exhibit) which involves action is a great deal more of a success in riveting attention than an exhibit which suggests a museum. To put it in the language of the day, where there's something doing there you'll find the

crowd and get attention, a fact which is made use of by the Salvation Army, among many notable examples.

As is usual in establishing any forest policy one of the first features of the work which has received attention has been the matter of fire protection. Since the appointment of the State Forester was made September 1, 1912, there was little opportunity to get any organization under way in the fall of 1912. An effort was made, however, to get together in usable form some information with regard to the extent and prevalence of fires and other essential information through the county officials. The result was exceedingly negative. In no one case was accurate information of value received. Early in the spring of 1913 the question of getting Kentucky into line under the Weeks Law was taken up. The proposition seemed simple enough and yet the matter was delayed from one cause



LOGS BEING HAULED TO RAILROAD

THE ONE ON THE WAGON IS WHITE OAK, 14 FEET BY 34 INCHES. IT SCALES 787 FEET SCRIBNERS RULE. THE SCENE IS NEAR KUTTAWA, LYON COUNTY, KENTUCKY

or other throughout the entire summer. In fact, it was the twenty-fourth of September before the Governor as Secretary of the State Board of Forestry signed the necessary agreements. With the cooperation of the Federal Government in fire protection in the State assured, it seems that a sound beginning of a fire protective policy has been made. This fall, two patrolmen at large for the State have been appointed and between twenty and twenty-five county patrolmen will be provided, such appointments being confined to those counties needing protection most. The details of this fire protective scheme have not as yet been fully worked out; but are in a fluid state. In connection with the plans for fire protection the active cooperation of the Fish and Game Commission through their wardens has been secured. Also the cooperation of timberland owners is a most desirable feature of the proposed plan, and in two quarters at least an organization

of the interested individuals is probable.

There are no public lands in Kentucky of any sort, from which State forests could be created. Undoubtedly, the value of State forests, scientifically managed, as concrete examples of the practicability of a forest policy for the State can not be over estimated. At the present time it seems that the only way the necessary land can be acquired is by gift or purchase. The former method is uncertain and vague; and the latter method is out of the question except, perhaps, in a very small way at the present time because of the limited amount available under the appropriation for the State Board of Forestry. Another way of obtaining the requisite land has been suggested, but does not seem feasible for a good many reasons; that is, turning tax-lands, suitable for the purpose of State forests, over to the State Board of Forestry. One of the principal objections to this is that the present squatters on the land would



TOOLS USED IN RIVING STAVES

HEATING AX, THROE BOLTING AX AND GAUGE ON "THE PONY" BLOCK. JACKSON COUNTY, KENTUCKY

constitute such an annoyance as to make the land untenable. Another difficulty is with regard to titles. The lands of the State, as a whole, are held in fee simple and, so far as Eastern Kentucky is concerned, are held by large companies, such as the coal companies. Eastern Kentucky is one vast coal field. It has impressed me in this connection that these companies are in excellent circumstances to practice scientific forestry with considerable profit to themselves and that here is a field which can be worked advantageously for the advancement of forestry in the State. The practice of scientific forestry has identical aims with the needs of coal operators; that is, a dependable timber supply over an indefinite period. Last year about $16\frac{1}{2}$ million tons of coal were mined in Kentucky. The amount of wood used in mining a ton of coal is roughly estimated at $3\frac{1}{2}$ feet board measure, so that this meant a wood consumption of over 57 million feet board measure. Certainly an important matter, especially in view of the fact

that the coal fields of Kentucky have but recently been operated to any extent. Here then seems a place where efforts to promote a sentiment in favor of forestry and encourage the growth of a forest policy among private owners is likely to be most successful. In Eastern Kentucky, the Consolidation Coal Company has already employed a forester, and in the Western Kentucky field the St. Bernard Mining Company have made extensive experiments in forest planting.

In the meantime, with a view of encouraging the planting of forest trees in the State, two forest nurseries have been projected, one at Frankfort and one at Louisville. The nursery at Louisville is well under way. It includes twenty-five acres of ground which is a part of the land owned by the Kentucky State Fair. It is intended that the nursery shall form a permanent exhibit as a part of the State Fair and that a demonstration forest shall be established as a portion of the permanent exhibit. The stock from the



BRINGING GALAX OUT OF THE MOUNTAINS
MT. MITCHELL AREA, YANCEY COUNTY, NORTH CAROLINA



ADMINISTRATIVE SITE PURCHASED FROM MRS. A. T. CONNALLY. REPAIRED BY FOREST SERVICE, MT. MITCHELL AREA, YANCEY COUNTY, N. C.

nursery will be furnished to the people of the State either at cost or free, a matter which has not, as yet, been fully determined. The nursery at Frankfort will be on a slightly different footing. The land on which the nursery will be established is controlled by the trustees of the Kentucky Normal and industrial School for Colored Persons. In addition to raising stock for the use of the citizens of the State, an effort will be made to teach the negro students such nursery practice, planting and care of trees as will enable them to qualify as caretakers of grounds, trees and groves on private estates, since there is a real demand for this character of knowledge and no supply of intelligent labor from which to draw.

The work, then, in Kentucky is shaping up along some pretty well

defined lines, as follows: (1) forest protection; (2) education; (3) forest extension, i. e., encouraging the planting of forest trees by supplying the material; (4) encouraging private owners to take up the scientific management of their tracts; (5) acquiring suitable tracts for State forests. It is expected that the work in the immediate future will develop largely in these directions. An effort will probably be made at the next session of the Legislature to secure a method of taxation favorable to the reforestation of suitable areas. Also it is expected that a law will be passed permitting the establishment of National Forests within the borders of the State. At any rate it now appears as if the forest policy for the State were on a sound footing.

AN EXHIBIT AT THE FOREST PRODUCTS EXPOSITION

AT its annual meeting on January 14 The American Forestry Association decided to have exhibits at the Forest Products Exposition to be held at Chicago April 30 to May 9 and at New York City May 21 to May 30.

According to advice received at the Chicago headquarters the exhibits of the lumber and allied associations alone will provide one of the most interesting and instructive displays ever arranged for an industrial exhibit in this country. It has practically been decided that the United States Forestry Service will display a number of most instructive

incidentals to the service, including Fire tower, Equipment station, Timbersale models, Erosion models, Relief map, Mine timbers, Greenhouse benches, Collection of scientific instruments, National forest model, Wood utilization exhibit, Wood distillation exhibit, Paper pulp exhibit, Timber testing exhibit, Wood preservation exhibit, Specimens of wood waste products manufactured from such waste and Bromides, transparencies, maps and charts. It is understood that some of the State forestry divisions will make exhibits.

The war department is reforesting a large area near Fort Bayard, New Mexico, for use as an army hospital site.

The light house reservations on the great lakes are able to grow all the white cedar needed for spar buoys in their district.

The Kaibab and the Coconino national forests adjoin each other. Yet it takes from two to three days to go from one to the other across the Grand Canyon of the Colorado.

THE SPRAG INDUSTRY OF EASTERN PENNSYLVANIA

By JOHN L. STROBECK

Pennsylvania Department of Forestry

IN this day of proper realization of the limit to which Nature bestows her bounty, and of the consequent conservation movement, any action which tends toward the closer utilization of Nature's products is a boon to the conservationist. The fact that the fruits of the soil were exposed to the exploits of man in an unduly high-handed manner, and with the discussion and agitation attendant thereto, left the impression that anything below a par excellence quality comprised the waste in our industries. Especially is this true in the timber industry.

Business is a matter of dollars and cents, and sometimes, a few accessories thrown in. Where those dollars do not come to the surface, the business becomes defunct. In the matter of Forestry, no progress has been made with the practical man unless he is shown its results in figures. It is true that Forestry is applied in cases where other motives besides the desire to gain money value is concerned. Also, there are cases where it is practiced with no particular end in view, but a man who looks for his living comforts to come from his lumber industry will not install the practice of Forestry to his business if it does not pay any more readily than he will an unprofitable office device.

But the fact that timber is being utilized as closely, in the judgment of the operator, as is permitted from a financial standpoint must be admitted. However, in many cases, he lacks somewhat in judgment. In this particular it is the intention to discuss in this article an industry, though small in extent, yet serves the purpose to show the extent to which timber in certain localities is utilized and how it may be extended to serve the purpose of closer utilization in other localities.

A sprag is a cylindrical piece of hardwood, twenty-one inches long and is pointed at both ends. Generally, specifications call for a thickness of from two and one-fourth to three and one-fourth inches. In certain mines, however, they require a somewhat more uniform size, namely three to three and one-quarter inch diameter.

Sprags are used in coal mines for the purpose of checking the speed of the small cars used therein. When it is necessary to check the speed of a car or train of cars, a sprag is thrown between two spokes of a wheel. When the wheel has rotated so that the sprag strikes the beam of the car, rotation of that wheel ceases entirely and the sprag has served its purpose in that the momentum of the car or train of cars is reduced.

Upon a sprag depends the safety of a car or train of cars when running down a grade in a mine. The cars are not equipped with "brakes" as ordinarily are found on cars above the surface. However, if a sprag breaks, it ordinarily, precipitates no undue excitement, for the train crew become, by experience, somewhat expert in placing a sprag even when the cars are moving rapidly. However, consuming companies generally, but not always, require sprags of certain specifications so that no undue risk is entailed by their use. A case where unusually small sprags were used came to the notice of the writer recently when in conversation with a mine "boss" who remarked with some bitterness, born of long usage of small sized sprags, that "this much-talked of conversation has a grand basis on which to make a claim by eliminating the small sprags from usage and thus prevent the undue waste, the breaking of the small-sized sprags entails."

Also, the species to which the making



SPRAG CUTTERS AND A PILE OF SPRAGS.

of sprags is restricted is the result of the necessity for strong and durable sprags. The oaks and maple are the species mostly used, the chestnut being excluded entirely. No softwoods are admitted and green timber is generally specified. However, in this respect, the companies are very lenient upon inspection and rightly so, as will be shown later.

As said before, the sprag industry is not of large size, and no doubt, represents a very small fraction of the entire wood product of the State. During the year 1912, the Delaware, Lackawanna and Western Railroad used 350,000 in their collieries. This represents a volume of 30,000 cubic feet, or 360,000 board feet of timber used in the collieries of one company for the purpose. It is estimated that about 6,000,000 sprags are used annually in the anthracite regions of Pennsylvania. Yet, since it is a product that may be made of what otherwise would be considered waste, it deserves attention in that such attention may be the means leading to the utilization of so-called waste for the purpose and not the oak and maple coppice of pole size from which almost the entire output is obtained at the present time.

An instance of such action has been

observed recently. That section of northeastern Pennsylvania from which the anthracite mining regions draw a large part of their mine supply timber is divided into many units of ownership. Since the region is mainly a timber region, the individual owner depends largely on his standing timber for the greater part of his earnings. In view of the instance mentioned above, the owner advanced to that stage of forest mismanagement when his merchantable timber down to mine-tie size was cut. However, a thrifty stand of oak and maple coppice of twenty years' growth remained on the ground. The best of this growth was cut for sprag timber and thereby left a residue of poor and thriftless stuff to form the future forest.

On a certain tract in Monroe County which is covered with a twenty year coppice growth of chestnut and oak in equal proportion as to density and which is being cut for the purpose of making sprags, the writer paced off three areas of one-quarter acre each. The poles of sufficient size to make sprags were counted on each area, and the following is the result:

- 1st area 80 poles average 4 sprags each, 320 sprags
- 2d area 78 poles average 4 sprags each, 312 sprags
- 3d area 65 poles average 4 sprags each, 260 sprags

By this observation it could be ascertained readily that 1100 to 1200 sprags per acre could be got of well stocked oak and chestnut coppice forests of the age of twenty years.

The prevailing price for sprags is \$12 per M. f.o.b. cars at shipping point. Dealers pay \$1 per M. less. However, where sprags of the largest size are specified, as much as \$14 per M. is paid.

Ten years ago, sprags were made entirely with axe and drawing knife. If a man made 200 of them per day, he was considered well at his trade. A machine was then devised with a knife which moved vertically with every revolution of the wheel which governed it. The sprag stick was held in an almost vertical position and at such a slant as to allow the knife, moving vertically, to taper the end of the stick to a point. At each fall of the knife, the operator would turn the stick a few degrees, and continued turning until the uniform taper was affected.

This machine gave poor results in that the process was too slow. It was not used very extensively and the sprag industry fell back into the domain of the handworker.

It was necessary to depend on the handworker only a few years, and three years ago, his elimination became permanent. A man of a mechanical turn of mind and now living at Mountain Home, Pa., devised a machine for the purpose by placing on a shaft two properly moulded wheels with planing knives set in each wheel. These wheels are so moulded that when they are placed one against the other on the shaft, the space between the two wheels in the direction of the shaft admits of a perfectly made sprag. A support on which to rest the sprag when in the process of making is built upon the base of the machine and extends upwards between the wheels to an inch below the plans of the axis. This support is raised by an extra block two inches higher at the circumference of the wheels, and in fact, must be adjusted so that the minimum jar is obtained.

A four-horse power gasoline engine

furnishes sufficient power to turn it. However, the more power is used, the faster and better the sprags are made. The operator places a sprag stick between the wheels, and as the wheels revolve, the cutting knives reduce the stick at the proper place, and by continually revolving the stick, it effects the desired point. This process is then repeated on the other end of the stick and thereafter, it is the finished product.

The sprag sticks are sawed in lengths with an ordinary circular saw attached to motive power. Two men can saw from 8,000 to 9,000 per day. However, it is inadvisable to saw such a large number at a time for the reason that the pile will become very large and, therefore, will necessitate carrying a great number of them a considerable distance to the machine.

One man can make one thousand sprags per day if the sticks are piled near him. Eight hundred sprags of mixed sizes make a load for two horses.

In the spring of 1911, a fire killed a stand of oak and chestnut coppice 14 years old on the Pocono division of the Minisink Forest Reserve in Pennsylvania on an area of about 75 acres. The timber was not merchantable because of size and the distance from market. However, the possibility of disposing of it in the form of sprags was looked into, and was found decidedly favorable. Accordingly, arrangements were made with the owner of the above mentioned machine for the use of a machine and the operation started. Almost 100,000 sprags were made from this area.

A contract was made with a party to furnish motive power and make the sprags complete from the pole for \$4 per M., and incidentally he made good wages. It cost approximately \$4 per M. to haul them to the railroad since only one trip a day was possible. To cut the poles in the woods cost \$1.30 per M. sprags, making a total cost of \$9.30 per M. sprags delivered at shipping point.

The use of the machine was obtained on condition that the output be sold to the owner of the machine who was also a dealer. Therefore, \$11 per M. was received, leaving a balance of \$1.70 for

timber. The Department of Forestry considered the operation a success in that it gave a return on what would have otherwise been waste material; also it removed so much dead material from the woods and thereby made the stand of dead trees less dense, and consequently, less of a tangle when they fall, thus assuring a fall closer to the ground and quicker decomposition.

Lying adjacent to this tract is a few hundred acres of oak and chestnut growth killed by the same fire. The sprag timber was gathered on about twenty acres, but on the remaining area, which is divided into a few ownerships and separate from the ownership of the twenty acres which were cut over, no attempt was made to utilize the timber, and the result is: a mass of wind blown trees covering the ground, an exhibition of wasted product, which, if taken in time, could have served a purpose of economic good.

During the winter of 1911-1912, there was undue activity in cutting oak and maple poles for sprag timber in the region adjacent to the above referred to areas. Undoubtedly, almost a suffi-

cient amount of timber could have been procured on the burned area to supply the sprags that otherwise were supplied from this region. The dealers preferred green timber in preference to dry timber for the reason that it worked with less exertion on the part of the operator. A profound regard for the literal meaning of "take no thought of the mo row, etc.," reinforced by the above referred to subserviency of spirit, resulted in an economic loss to the community of both the labor, cost, and the profit of operation of the dead stand as well as the loss of the growing stock of a future stand.

The sprag industry is, typically, an industry which disposes of otherwise waste product in the ordinary lumbering operation, in that the consumption of sprags is of very limited extent and can be supplied by such "waste"; and besides, the very nature and dimensions of this product calls for that part of the product of the ordinary lumbering operation—especially where mine supplies are the chief product of such operation—which is considered "waste."

FORESTRY COMMITTEE REPORTS

Reports of the Forestry Committee of the National Conservation Congress in pamphlet form may be secured from the American Forestry Association for \$1.00 a complete set or 20 cents each.

These Reports are on:—

Forestry Committee Organization	State Forest Policy	Forest Utilization
Forest Publicity	Forest Taxation	Forest School Education
Federal Forest Policy	Forest Fires	Forest Investigation
	Lumbering	State Forest Organization
	Forest Planting	

THE ANNUAL MEETING

HAVING cooperated with the National Conservation Congress in the very successful forestry conference in November, the annual meeting of the American Forestry Association at Washington, D. C., on January 14, 1914, was confined to a business session, for the election of officers, the adoption of a platform of principles and policy and consideration of routine business.

Henry Sturgis Drinker, president of Lehigh University, was re-elected president of the Association; Hon. Franklin K. Lane, Secretary of the Interior; Hon. David Houston, Secretary of Agriculture, Hon. Thomas Nelson Page, United States Ambassador to Italy and Mr. George W. Vanderbilt were added to the list of vice presidents, the gentlemen who served in this capacity last year all being re-elected.

Mr. Otto Luebker of Washington, D. C., was re-elected treasurer.

Mr. C. W. Lyman of New York, Mr. Charles Lathrop Pack of Lakewood, N. J., Mr. John L. Weaver and Mr. Otto Luebker of Washington, D. C., were re-elected directors for a term of three years and Mr. Alfred Gaskill, State Forester of New Jersey, was newly elected a director for the same period. Mr. E. A. Sterling of Philadelphia was re-elected an auditor for two years.

The platform of principles and policy which was unanimously adopted will be found in the front section of this magazine.

It was decided to hold the 1915 convention at San Francisco, during the Panama-Pacific International Exposition, the date to be selected shortly. The day selected is to be known as American Forestry Association Day, and it is the purpose of the Association to invite every country in the world to send representatives, and invitations will be extended to all State forestry organizations, conservation associations and commissions, fire protective bodies and lumber and paper trade associations to send delegates. It is proposed

to make it the greatest gathering of foresters, and all interested in forestry, that the world has ever seen.

The financial report was the most encouraging that the Association has heard since its organization. Not only was the work of the Association greatly extended during the year, its general activities increased and its magazine greatly improved, but it increased its membership by adding over fifteen hundred new members and earned a considerable fund which will be used in further development work during the present year.

The report of the Secretary, P. S. Ridsdale, was as follows:

THE SECRETARY'S REPORT

The Secretary reports that the Association's work during 1913 has resulted in a gratifying growth of the interest in forest conservation, and a generally wider appreciation of the activities of the Association, and the value of such an organization. This is indicated in the increase in membership during the year, the greater number of requests for forestry literature and advice regarding forestry development, and the broader general knowledge that the Association is working along essentially practical lines in furthering forestry conservation. The Association continues to be self-sustaining and the financial difficulties which it experienced in past years are not likely to be renewed. There is a steady increase in active membership and in demand for the magazine and this growth is general and not limited to any one section of the country.

It is satisfactory to note that big timber owners, lumbermen, loggers, wood preservers and all others interested in the growth of trees and the uses of wood are acquiring, in greater number, an interest in the work of the Association: and a realization of its need. There has not been, to the knowledge of the Secretary, any adverse criticism of the work which is being done. In-

stead this work and the results achieved have been from time to time heartily commended by various lumber and paper trade publications and by the newspapers and magazines, as well as by individuals.

During the year the Association took an active part in approving or opposing various forestry legislation, both State and National. The effort to take 40,000 acres of the Pike National Forest from the control of the Secretary of Agriculture and turn it over to Colorado Springs and Manitou, was successfully opposed, with the result that the two towns now have the watershed protection they needed while the forest on this watershed remains under the administration of the Department; valuable assistance was given in securing the passage of forestry legislation in Pennsylvania; in preventing the New Hampshire legislature passing unwise forestry laws which would have hampered the State Forestry Department; in aiding the Wisconsin State Forestry Department's opposition to political interference with its work; and in giving aid and supplying information to various forestry organizations, forest schools, forestry committees of different associations, and to individuals.

The Association also opposed reductions in the Agricultural Appropriation bill for the Forest Service work; and did what it could in enlightening members of the 62nd Congress regarding the States Rights movement, and various forestry legislation which was presented or was proposed for presentation to the Congress. Letters from the Association to various clubs of the American Federation of Women's Clubs resulted in large numbers of letters and resolutions protesting against State control of the national forests being sent to members of Congress.

During the year the Board of Directors and the members of the Executive Committee have been most active in looking after the business of the Association and in directing the work. The directors held a meeting at Asheville, N. C., on March 25, 26 and 27 and there an examination was made of the forest planting on the estate of Mr.

George W. Vanderbilt, of the forestry conditions on Mt. Pisgah and addresses were given at a large public meeting in Asheville by President Henry Sturgis Drinker and other officials and members of the Association. In July the directors held a meeting at Lake Sunapee, N. H., in conjunction with the Society for the Protection of New Hampshire forests and various other forestry, timberland and fire protective societies and there forestry addresses were made by its officers and members at several public meetings. The Association was also represented by officials and members at a number of conventions of forestry organizations, lumber, timberland, forest fire protective and wood preservers associations and conservation bodies during the year, both in the United States and Canada, this resulting in a wider knowledge of the Association's activities and a deeper appreciation of what it has done, is doing and is striving to accomplish.

Too much importance cannot be attached to the value of the Association's cooperating with the National Conservation Congress in securing the investigation, by competent committees, of vital questions in forestry and lumbering. Several of our members raised several thousand dollars which enabled the forestry committee and its ten sub-committees to not only thoroughly investigate various phases of forest fire protection, forest planting, State forest policy, Federal forest policy, forest taxation, forest investigations, lumbering, forest publicity, forest school education, and forest utilization, but to have these reports printed in pamphlet form for general distribution at the Congress here in November, and now to be published in book form together with the discussions on the reports, the addresses and the resolutions of the forestry section of the Congress, as a matter of permanent record. Officials of the Association composed the Forestry Committee of the Congress and most of the members of the sub-committees are members of the Association, while the office force of the Association gave much time during the fall to aiding in this work, and to the details of ar-

ranging for the forestry banquet given here during the Congress.

During the year our president, Henry Sturgis Drinker, president of Lehigh University, has delivered addresses on forestry at Tome Institute, Md., Lake Sunapee, N. H., Asheville, N. C., the Wholesale Lumber Dealers Association convention at Atlantic City, Allentown, Pa., Wilkes Barre, Pa., and other places and these have been published and widely distributed.

The Board of Directors has arranged to hold a meeting at Cornell University on May 15, at which time a new forestry building is to be dedicated, and also to hold a meeting at Chautauqua, New York, in July, upon which occasion the five thousand people expected at Chautauqua at that time will be addressed on forestry subjects at six big meetings, lasting through two days. This meeting is expected to prove of great educational value to the forestry cause.

The Board has also arranged to hold the annual convention of the Association in 1915 at San Francisco, during the Panama-Pacific International Exposition, at which time it is expected to have representation from every country in the world having any interest in forestry. The Exposition managers have offered to set aside a special day of the Exposition to be known as American Forestry Association Day, and plans are already under way for making this day the most notable in the annals of forestry in this or any other country.

A membership and circulation campaign was conducted steadily during the year by means of letters sent to persons who are or who should be interested in forestry conservation, names being secured from personal nominations by members, and from lists of various organizations. This sort of campaign was effective enough to secure 1,520 new members and subscribers. A still more effective method of securing members and subscriptions would be the placing of field agents in various sections of the country, these agents being qualified to make addresses on forestry, to aid State and local forestry associations in perfecting their

organizations and to generally arouse interest in the forestry conservation movement, as well as to personally solicit memberships and subscriptions.

It is gratifying to state that the financial report of the treasurer shows a healthy and a steady growth, the receipts from memberships, subscriptions, and advertising being more than in any year in the history of the Association.

It is perhaps unnecessary to call attention to the improvement in the quality of the magazine AMERICAN FORESTRY during the year. Not only has there been a marked improvement typographically, and in the quality of the paper used but the effort to secure articles of greater value and interest to the readers has been successful, while the increase in the number of illustrations used has materially added to the attractiveness of the magazine. These improvements have been made at considerable cost but they have been valuable in drawing attention to the magazine, holding the interest in it, and in inducing voluntary subscriptions.

Two features, in the conduct of the magazine during the year, deserve special attention. One was the greatly enlarged November issue, devoted to forest fire protective work and profusely illustrated in colors, the cost being about twice that of the regular number; and the other being the additional special number issued during the sessions of the National Conservation Congress and summarizing, for the benefit of all our members and subscribers, as well as for general distribution at the Congress, the work of the forestry committee and the ten sub-committees.

Twenty-five hundred additional copies of the May issue were printed for distribution at the forest exhibition of the Pennsylvania Forestry Association in Horticultural Hall, Philadelphia, during the week of May 19, at which time the Association had an exhibition which attracted much attention.

In July the Association took over the business management of the *Forestry Quarterly*, Dr. B. E. Fernow of Toronto remaining in editorial charge. The Association is assured by one of its members against any loss in the pub-

lication of the *Quarterly*. So far, however, there has been a small profit and this will be increased during the coming year.

The Association acknowledges with thanks and appreciation contributions from Mr. Charles Lathrop Pack, The Lehigh University Forestry Fund, through Dr. H. S. Drinker, Mr. W. R. Brown, Capt. J. B. White, Robt. P. Bass to provide for the work of the forestry committees of the National

Conservation Congress and the publication of their reports; from Mr. Charles Lathrop Pack and the Forestry Fund of Lehigh University, through Dr. H. S. Drinker, for the foresters banquet at Washington, D. C., on November 19; from Mr. Charles Lathrop Pack and the International Paper Company of New York, for improvements in the magazine, and the bequest of \$5,000 from the estate of Miss Jane Smith of Pittsburg.

PRIZE FOR AN ESSAY ON FORESTRY

THE Indiana State Board of Forestry, in the endeavor to get everyone interested in the preservation of forests as far as this can be done without loss to owners, and the establishment of forest plantings on all land that is not suited for agriculture, has offered prizes aggregating \$40.00 for the best essays on Forest Influences. \$12.50 is to be given for the best essay and \$7.50 for

the next best. Also \$12.50 is to be given for the best and \$7.50 for the next best essay by pupils in the graded and country schools. The essay must not be more than 2,000 words. It should be mailed to Elijah A. Gladden, secretary of the State Board of Forestry, Indianapolis, not later than May 1. He will be glad to send anyone the rules governing the contest.

INDEX FOR 1913

The Index for Volume 19, 1913, of American Forestry is now ready and may be had on application by mail or otherwise by any subscriber or member. Requests may be sent to the main office of the American Forestry Association, 1410 H Street, Washington, D. C.

There are several bands of the Persian fat-tailed sheep on the national forests of southern Utah. The large fat tail sometimes weighs as much as forty pounds, and, like the hump on the camel, is a reserve supply of nourishment when food is lacking.

Dr. B. E. Fernow, dean of the forest school of the University of Toronto, and Bristow Adams, of the U. S. forest service, have just been elected president and secretary, respectively, of the society of American foresters, the only organization of professional foresters in the western hemisphere.

HETCH HETCHY TIMBER AFFECTED

SPECIAL investigations by the experts of the Department of Agriculture have shown that as much as 95 per cent of the timber in some of the canyons and valleys of the Toulumne River, which is to supply the water for the Hetch Hetchy project, has been killed by bark-boring insects.

The areas in which practically all of the timber has been killed, some of it many years ago, are Jack Main Canyon and Matterhorn Czynon. It was found that the forest growth of the entire watershed was more or less affected, and that the destructive insects were killing a great amount of timber from near Tenaya Lake through the forests surrounding Toulumne Meadows to and through Virginia Canyon.

This alarming condition, affecting as it did the scenic beauty of the area north of the Yosemite Valley and its consequent effect on the water supply and general economy of the Hetch Hetchy project, presented a problem of great importance.

As soon as the matter was called to the attention of the Secretary of the Interior in the fall of 1912, he appealed to the Secretary of Agriculture for such advice and assistance as his Department could render through the expert who has charge of the forest insect branch of the Bureau of Entomology.

The matter received the required prompt attention and arrangements were soon made for active warfare against the depredating beetle. A plan of procedure was outlined by the expert and recommended by the Secretary of Agriculture to the Secretary of the Interior. According to the plan, the Interior Department was to allot the required funds, the control work to be carried on under the immediate supervision of an entomological assistant of the Bureau of Entomology. This plan was adopted and the work was started just as soon as the weather conditions permitted in June, 1913.

The areas near Tenaya Lake and in

the Cathedral Basin around Toulumne Peak to the Toulumne Meadows were carefully cruised for the location and marking of the particular trees, in the bark of which the broods of the destructive beetle had passed the winter. Two areas representing centers of infestation were thus located and designated—one as the Tenaya Project, the other as the Cathedral Project.

Control work was started on the Tenaya Project on July 1, and finished when the beetles began to emerge from the bark on July 24th. Work on the Cathedral Project was started on September 8th, after the beetles coming from the overwinter broods had entered the bark of the living trees, and was completed on October 7th.

The method recommended and followed was to fell the infested trees, lop off the limbs, pile them on the prostrate trunk, and set fire to it; thus the infested bark was scorched or burned to a sufficient extent to kill the broods of the insects. The trees thus treated ranged in diameter from 6 inches to 54 inches, with the average of about 22½ inches.

One thousand, six hundred and seventy-one trees were treated in the two projects, at a cost of \$1,158, including all expenses except the salaries of two representatives of the Bureau of Entomology who directed and assisted in the work.

It is claimed that this work, with an additional expenditure of about \$500 next season, will be sufficient to bring the beetle under such control that very little attention will be required to protect the remaining living timber from further serious injury. Both, this and an infestation in the timber around the rim of the Yosemite Valley will receive the required attention next season. The Interior Department has expressed a determination to prosecute a warfare against the depredations of insects in the Yosemite and Glacier National Parks to the limit of the funds available for the purpose.

The insect which is directly responsible for the death of such a large percentage of the lodgepole pine timber of the northern section of the Park is known as the mountain pine beetle, the technical name of which is *Dendroctonus monticolae* Hopkins. It attacks perfectly healthy trees and kills them by mining between the bark and wood in such a manner as to stop the movement of sap and kill the bark which results in the final death of a tree within ten to twelve months after it is attacked. This beetle is the most

destructive enemy of the lodgepole pine, western yellow pine, and mountain or silver pine of the entire Pacific Coast and Northern Rocky Mountain region. A vast amount of the best timber of these regions has been killed by this beetle during the past fifty years and has gone to waste through the agencies of decay and forest fires, but, thanks to the discoveries of the experts of the Bureau of Entomology, it can now be controlled and a great waste of forest resources prevented in the future.

FORESTRY LAW FOR VIRGINIA

A NUMBER of Virginians, interested in the proper management of the forests of the state are urging the members of the state legislature to pass a new forestry law at the present session. This law provides for the establishment of a permanent Forestry Board, which shall employ a technically trained forester who shall have power to carry on fire protective work and other functions of a state forester. An appropriation of \$10,000 is to be asked for carrying on the work during the present year.

The law was drafted by Dr. Howard S. Reed and his associates of the Virginia Polytechnic Institute at Blacksburg, and has already been fully explained to the Executive Committee of

the Board of Visitors of the college. The law provides that this Executive Committee shall serve as a State Forestry Commission without compensation.

Besides providing for the other regular duties of a state forester the proposed law provides that he shall annually deliver a course of lectures at the Institute at Blacksburg upon forestry and silviculture; shall give instruction in farm forestry to the county demonstrators and by lectures before farmers institutes and other organizations.

The prospects of this bill passing the legislature and being signed by the Governor are bright.

GOVERNOR GLYNN FOR FORESTRY

GOVERNOR Martin H. Glynn of New York is an ardent believer in forest conservation, and in his message makes recommendations regarding forestry conditions in the state which will be heartily endorsed by every one who appreciates the value of the forests and their perpetuation. He declares that the forests are the foundation of all conservation activities as they provide water supply, forest

products and a home for fish and game. He urges resumption of buying of forest lands for the extension of the Adirondack and Catskill parks. He calls attention to the fact that the reforestation of state lands is making slow progress and that instead of a few thousands, tens of thousands of acres should be planted annually. He believes that the state should go further than providing seedlings at cost for the replanting of

private forest lands and should plant these lands at cost, as its forestry employes know the business of tree planting and private owners do not. He also urges the amendment of the State Constitution as follows: (a) To permit the leasing of camp sites in the State Forest Preserves, to afford the people a freer and more satisfactory use and enjoyment of their own recreation grounds; (b) To permit the utilization of mature

and dead timber in the Forest Preserves, under State supervision, which would not only result in a revenue of millions annually to the state, but would also improve the condition of the growing timber in several ways; (c) And, to authorize the construction of roads through the Forest Preserves for forest fire protection and other public purposes.

A SOUTH CAROLINA FORESTRY LAW

A DETERMINED effort is to be made to have the South Carolina legislature pass a forestry law this year which will give to the state the kind of forest management best suited to the interest of its people.

The proposed law provides for the appointment of a state board of forestry, comprising nine members, the Governor of the State, the director of the South Carolina State Experiment Station; the Commissioner of Agriculture; the president of the University of South Carolina; the President and the professor of Forestry at Clemson Agricultural College, and three persons to be appointed by the Governor.

This board is to appoint a technically trained man as state forester at a salary not to exceed \$2,500 a year. He is also to act as secretary of the board.

The forester is to have charge of all matters pertaining to forestry in the jurisdiction of the state; to carry on an educational forestry campaign by giving lectures, preparing bulletins, advising colleges and schools regarding courses of instruction in forestry; to co-operate

with towns, corporations and individuals in preparing plans for the utilization, protection, management, and replacement of trees, wood-lots and timber tracts, under an agreement that parties obtaining such assistance pay the field expenses of the men employed in preparing such plans; to have charge of all the forest wardens, employ proper means to prevent and to fight forest fires and to enforce forest and woodland laws.

The law also provides that all rural lands to which the state now has title, or may acquire title, shall if suitable for a forest, be held as a state forest. These lands are then to be used to demonstrate the practical utility of timber culture and for the purpose of forest management.

Stringent provisions are made in the proposed law for fire protection on the lines approved by the Forest Service. The proposed law also provides for an appropriation of \$10,000 for the salary of the state forester and the expense of carrying on his work in 1914.

There are 36,500,000 young trees in the government's forest nurseries.

Two tons of cascara bark have just been sold from the Siuslaw national forest, Oregon, at one cent a pound.

The northernmost national forest is the Chugach in Alaska; the southernmost is the Luquilloin Porto Rico.

For shingles alone, 750 million feet of timber is cut in that part of the state of Washington which lies west of the Cascades.

A SYLVAN MEMORIAL

By WM. R. FISHER

THE planting of a tree, here and there, to commemorate the visit of a distinguished person, or to mark some notable event, has been a common custom for a long time. Usually there is much ceremony and a gathering together of a crowd of on-lookers and some prominent locality is selected for these formal tree plantings—the college campus, the city park, or the site of historic doings,—memorable achievements of the peaceful arts, or the warroir's reminder "of old, unhappy, far off things, and battles long ago."

But the planting of some thousands of seedlings, with the intention of making trees, when they grow up, serve as a memorial to the dead, instead of erecting a monument of carved stone, is certainly new and interesting to the forester.

Mrs. Flavia Camp Canfield, widow of the late James Hulme Canfield, LL. D., a former president of the Ohio State University and subsequently Librarian

of Columbia University, New York City, has recently devised this novel and beautiful tribute to her departed husband. At the family homestead at Arlington, Vt., twenty thousand white pine seedlings have been set out, and the plantation will hereafter be known as the Memorial Pines.

One may hardly say of such a monument what the Roman poet said of his verse—that it would outlive a monument of bronze; and yet, under watchful care to exclude destructive fires, there is no limit to the continuance of such a woodland.

Most people find it hard to break away from the conventional way of doing things. It is not likely that there will be many imitators of this lady, but there are some who will feel that no more dignified method could be found, of expressing love and respect for the memory of one who has gone than this sylvan monument.

FULL TITLE UNDER THE WEEKS ACT

The completion of the payment by the United States government, acting through the department of agriculture and the forest service, for lands in the town of Benton, New Hampshire, sold by the Pike Woodlands company and E. Bertram Pike, places the Federal Government in full title and possession of the first tract which it has acquired in the White Mountains under the Weeks act.

The Moosilauke tract comprises the northerly and westerly slopes of Mount Moosilauke and will furnish a valuable example of modern forestry practice under varied conditions which are typical of large areas in our mountain region.

It is understood that the Forest Service will proceed at once to construct necessary trails and fire stations in order that the property may be protected from injury by fire and at the same time may be accessible to the public for all reasonable uses. The mature timber on the tract will prob-

ably be sold for commercial uses, the cutting being conducted in such manner as to benefit rather than to injure the remaining growth.

The tract is quite accessible to the public, being only a short distance from the Glenclyff station on the White Mountain division. It adjoins the property owned by the state in connection with the sanitarium at Glenclyff. Mr. Pike owns or controls large areas in the same vicinity which he is planning to improve on forestry lines, including the extensive tract owned by the Lake Tarleton club in the town of Piermont which overlooks the Moosilauke reservation.

Allen Hollis, Esq., of Concord, who represented Mr. Pike and the Pike Woodlands company in the proceedings for condemnation, is receiving congratulations in being instrumental in bringing into New Hampshire the first actual payment on account of a government purchase.

GOVERNMENT MAKES LARGEST OFFERING OF TIMBER

WASHINGTON, Jan. 5.—Secretary of agriculture, Houston has today approved the disposal of one billion feet of western yellow pine timber from the Kaibab national forest in northern Arizona. In order to get this timber out it will be necessary to build a railroad approximately 200 miles long. Such a railroad will connect Colorado and Utah with the world-famous Grand Canyon of the Colorado, which hitherto has been accessible only from the south.

For several years the construction of such a railroad has been considered by various capitalists, but it has been stated that the lack of assured immediate traffic was an effectual barrier. It is pointed out, however, that a contract for a billion feet of timber will overcome this difficulty by providing a commodity for transportation which, together with tourist and local traffic, will place the project on a paying basis practically from the outset.

Chief forester Henry S. Graves made a personal examination on the ground, and this examination supplemented by the reports of his forest engineers, induced him to recommend the sale of

such a large body of timber in order that the country might be developed through the supplying of this resource. Mr. Graves says, however, that the Kaibab forest is one of the most beautiful in America, and gives assurance that the marketing of the mature crop of timber will not be allowed to mar the scenic beauty of the region.

In accordance with the timber sale policy of the government the stumpage will be disposed of to the highest bidder. In order to attract a sufficient investment to assure the building of the railroad and of the necessary lumber mills at least a billion feet of timber had to be offered. The investment necessary to make this timber accessible will amount to more than \$3,000,000. By placing this quantity of timber before the lumbermen of the country the officials of the forest service believe that the development of extensive areas in southern Utah may be looked for, because the necessary railway will render accessible resources which have heretofore been undeveloped. The whole region is rich in agricultural land, in cattle and sheep range, and in coal and copper deposits, as well as in timber.

What a Forester Should Be

This definition by Dr. C. A. Schenck of what a forester should be well deserves reproduction. He says:

"A forester should stand the life in the woods like a tree; and should stand the knocks in the mill like a log; lest he go to waste with the culls."

ANNUAL MEETING OF THE NEW YORK STATE FORESTRY ASSOCIATION

THIS active and growing organization in the Empire State held its first annual meeting on January 22, 1914, at Albany in the new Educational Building. The attending foresters were welcomed by Dr. John H. Finley, President of the University of the State of New York, and Commissioner of Education. Dr. Hugh P. Baker, a member of the American Forestry Association and now head of the State Forestry School at Syracuse University, New York, was the organizer, and is the Secretary of the Association, which is already doing a great work for New York State in the promotion of the State's forestry interests. There was much interesting discussion relative to the extension and care of the State's forest reserves and particularly of the proposed amendment of the existing provision in the State's Constitution forbidding all cutting on the State reserves.

Dr. Henry S. Drinker, President of the American Forestry Association, was present by invitation, and made an address in which he touched as follows on the above question:

"Foresters and the friends of forestry in your sister States are noting with

great interest the discussion in New York looking to a revision of the policy adopted in the past of denying to New York the benefit in the management of the State's woodlands of the principles of forest culture, cutting, and reproduction that have been generally approved in Europe and America as conducive to the economic and profitable management of forest lands.

"Local conditions may have made it necessary or advisable to deny to your State forest lands the exercise of the principles of forestry, in the interest of retaining your forests for a time in a wholly wild condition as a refuge for game and a wilderness home for the man who would for a time fly from civilization, but surely with forests aggregating over 1,600,000 acres in New York State, by far the largest State Forest Reserve of any State, the time must soon come when the State constitutional prohibition against all cutting shall be amended, and the great Forest Reserves shall be handled as the National Forests are so admirably handled, with a view to the best care and conservation of your woodlands for the benefit of the people at large of the State and of the State's industrial interests."

MASSACHUSETTS WANTS STATE FORESTS

MASSACHUSETTS, which has only a few hundred scattered acres of state forest land now wants its legislature to pass a law creating a state forest commission to acquire land suited for forestry and create state forests. About one million acres, one fifth the area of the state is now wild and waste land, worth very little. Private owners cannot afford to reclaim this land, many of the towns are too poor to do so and the state is the only agency that can deal with the problem.

If the proposed measure becomes a law, the land will be well protected against forest fires; employment may be given prison labor; the forests could be used for public recreation and could become bird and game sanctuaries; as well as serve the very practical purpose of protecting water from impurities and conserving water power.

An earnest effort, in which the Massachusetts Forestry Association is aiding, is being made to have this proposed law passed.

ANNUAL REPORT ON YOSEMITE NATIONAL PARK

THIRTY-FIVE miles of new trail have been built in Yosemite Park during the last year, according to the annual report of the superintendent, recently made to Secretary Lane. There are now in the park 578 miles of trail and 147 miles of wagon road.

"In order to protect the big trees from fire," says the superintendent, "approximately 80 acres of the upper grove of the Mariposa Big Trees have been cleared of debris, fallen timber, and jungle growth of shrubs and young yellow pines and firs. Sixty acres of this tract were cleared some years ago while the grove was under the control of the State of California.

"In order to thoroughly safeguard this portion of the national park from fire the work should be continued next year and succeeding years until both groves are cleared and a fire brake constructed on the eastern boundary. This clearing process should be extended to the Toulumne Grove of Big Trees where it is much needed.

"On October 30, 1913, there was planted on both sides of the road

extending from the Sentinel Bridge to Kenneyville on the north side of the Merced River, a row of sequoia seedlings. The rows were placed 104 feet apart, the trees in each row 80 feet apart. Another line of sequoias was planted on the northern border of the woods which grow in the southern part of the meadow lying west of the village.

"On the same date a party of enthusiasts planted six sequoia seedlings in a semicircle around the front of the Le Conte Lodge. There has also been planted on both sides of the road between Camp Ahwahnee and Pohono Bridge, at suitable places, sugar-pine seedlings, rows and plants at suitable distance apart. Likewise have sugar-pine seedlings been planted near the river along the meadow below the mouth of the Yosemite Creek.

"October 30 has been designated as "Arbor Day" for the Yosemite National Park, and the avenue from the Sentinel Bridge to Kenneyville has been named "Sequoia Lane." A future generation will there observe the most beautiful avenue in the world."

THE FIRE FOOL

(With apologies to Rudyard Kipling)

A fool there was and he flung a match
Even as you and I,
Carelessly down on a sundried patch
Giving no heed that a fire might catch
And spread to the timber with quick dispatch,
Even as you and I.

The fool returned on his way and found
Even as you and I,
Ashes and embers all over the ground,
And far in the distance with horrible sound

The fire consuming the timber around,
Started when he went by.

The fool passed on with a wondering look
Even as you and I.
He couldn't explain the fire that took
The forest away, and dried the brook,
And left the region a place forsook;
He was a fool—that's why.

A. G. Jackson in *Seattle Sun*.

FOREST NOTES

New York City is far behind many smaller cities of the country in controlling the planting of trees in its streets and in the care of trees after planting. The Landscape Engineer of The State College of Forestry at Syracuse is making a very careful reconnaissance survey of street in New York in cooperation with the Tree Planting Association of the City for the purpose of securing material which may be used to stimulate interest in more and better street trees. It is believed that the interest aroused will result in the formation of a definite and unified system of tree planting under the direction of a Tree Planting Bureau headed by or made up of trained Foresters.

The rates of transportation into and through the Yellowstone National Park by way of the western entrance at Yellowstone, Montana, have been reduced 20 per cent by Secretary Lane. This means that one dollar a day has been taken off the rate which has heretofore been charged to tourists in the park coming through this entrance. This reduction is due to a contract for carrying passengers in the park which has been awarded by the Department of the Interior to Messrs. F. J. Haynes, Robert Duff, and R. W. McTavish, a corporation known as the Yellowstone Western State Company. This action is greatly in the interest of the traveling public, inasmuch as it will enable persons to make the complete park tour for \$20 whereas the rate heretofore has been \$25. Corresponding reductions will be made in the 4-day, 2-day and other short trips in the park.

Acting Secretary of Agriculture B. T. Galloway has just given a permit to James Lindsey, of Portland, Oregon, for the construction and operation of a power plant on Mill Creek, Douglas

County, Oregon, within the boundaries of the Siuslaw national forest.

Mr. Lindsey intends to transmit the power obtained from this hydro-electric plant a distance of eighteen miles to Reedsport, Oregon, where it will be used in the manufacture of pulp. There are now at Reedsport a fish cannery, a cold storage creamery, and a warehouse, but when the Southern Pacific Railroad completes the extension upon which it is now at work, Lindsey and others who are associated with him in the development of Reedsport believe that the town will become a valuable manufacturing and shipping center. Besides the power plant and pulp mill, other industries are contemplated by the men interested in the town. They claim to see possibilities of an excellent future, based upon resources, power, and transportation facilities.

The largest remaining virgin stands of white pine in the United States are found in Minnesota, according to a State report recently published. These, in addition to the stands of Norway and jack pine, spruce, tamarack, and balsam fir, add much to the State's timber wealth and make it contain some of the most valuable timber resources east of the Rockies.

The report which gives these facts deals with the wood-using industries of the State and is the result of cooperation between the State and Federal authorities. The field investigations were conducted by members of the U. S. forest service. Certain statistics on present and future supplies of Minnesota's timber were contributed by W. T. Cox, State Forester, who brings out the diminishing timber resources of the State, and advocates measures for conserving them.

Twenty different wood-using industries are reported, not counting saw-mills, shingle mills, cooperage and pulp

works, which are not included in an investigation covering only manufactured commodities.

The wood-using industries require 45 kinds of wood, of which 20 grow in Minnesota and all but three are native to the United States.

The widening and repairing of the roads in the Mesa Verde National Park is what is most needed to make that reservation accessible to tourists, according to the annual report of the superintendent. This park is in southwestern Colorado and has an area of about seventy-six square miles.

Secretary Lane, of the Interior Department, has asked the President to withdraw certain lands for the proposed Denver Mountain Park, Colorado, pending consideration by Congress of a bill for the creation of the park. The area covered by this withdrawal is over 34,000 acres. In a general way this land is of no substantial value for agricultural, mineral or other purposes, though it is an ideal location for a park. It is in a region of broken land, rocky in character and having many canyons, but the City of Denver desires to inclose the tract, if ceded to it for park purposes, police it, build drives to and through it, and, generally speaking, make it one of the additional attractions of the city.

California led last year in timber sold from national forests, though Montana has the largest number of sale transactions.

The biological survey and the forest service have been co-operating in the extermination of ground squirrels on national forests in California. The annual loss of range feed and grain crops from ground squirrels is enormous.

The Northern Forest Protective Association of Michigan has just completed the posting of nearly one thousand direction signs upon the outlying roads and trails of the Upper Peninsula. These signs were put up solely as a kindness to woods travelers, and to properly direct them to the location being sought or to a place where protection and lodging could be found.

This is the first effort with any breadth of scope to properly designate the roads and camps of the Peninsula, and if it meets with the approval of the general public it will be continued until it is almost impossible for one not familiar with the woods to become lost.

During the season of 1913 travel to the Mount Rainier National Park increased 52 per cent as compared with 1912, according to the annual report of the superintendent, recently made to Secretary Lane. Mount Rainier is one of the most accessible of the national parks, being only 56 miles from Tacoma and 93 miles from Seattle.

Near the center of the park is the summit of Mount Rainier, from which radiates a system of glaciers ranking in importance with any similar system or group of glaciers in the world. There are more than a score of these glaciers from which flow headwaters of four important rivers—the Nisqually, the Puyallup, the White, and the Cowlitz.

STATE NEWS

Michigan

At a recent meeting of State Forest Service officers, plans were formulated for bringing about the State and Federal Government the exchange of a considerable acreage of forest land. As a result of this meeting the examination of the lands in question was begun and the field work will probably be completed by the middle of January. The State lands which the Government will acquire, consist of about 15,000 acres intermingled with the Government holdings in the Marquette National Forest in Chippewa county and in the Michigan National Forest in Iosco county. In exchange for this, the State is to receive an equal area of Government lands. Should this exchange be consummated, it will result in the addition of about 4,000 acres to the Marquette National Forest and 11,000 acres to the Michigan National Forest. On the other hand, the acreage of the Higgins Lake State Forest in Crawford and Roscommon counties will be increased by about 1,400 acres, the Houghton Lake State Forest in Roscommon county by 3,600 acres and the Lake Superior State Forest in Luce county by 10,000 acres. From an administrative point of view, the exchange would be highly beneficial to both parties, inasmuch as it would be a big step towards the consolidation of their respective holdings.

To keep pace with the increased demands for planting stock for reforestation projects on the State Forests, the nursery at the Higgins Lake State Forest has recently been enlarged. Formerly this contained only five acres. With the addition that has been made, there are now a little over ten acres of available growing space. At present there are in the nursery approximately 3,000,000 seedlings and transplants of various coniferous species. The addition will make it possible to double, or perhaps treble the present output.

Pennsylvania

The Department of Forestry announces the final purchase of what is known as the Pine Grove Furnace property in the South Mountains. This property was for a long time under the direction of Jay Cooke who was very largely instrumental in helping to finance the civil war. With the recent turning over of 7,562 acres of land, the State now owns in the South Mountains a forest extending in one continuous body almost from the Susquehanna river to the Maryland line, and having a total

area of 70,000 acres and bringing the total acreage of the State forests up to 994,062.

Georgia

Recently a woodlot was examined and reported on in Habersham County by officials of the Forest School, University of Georgia, and on this trip an address was made before the Nacoochee Institute at Sautee in White County.

Later on Professor Akerman made a trip on the other side of the Blue Ridge, delivering addresses at Hiawassee, Young Harris, and Blairsville, reaching over 900 persons. The talks stressed the need for protection from fire. At the time fires were running in the mountains and the air was full of smoke, so that the talks were to the point.

Kentucky

During the latter part of 1913 there were a large number of forest fires, particularly in the eastern part of Kentucky. State Forester Barton says: "The fire plan inaugurated by the office of the State Forester in cooperation with the Forest Service of the United States Department of Agriculture has been effective so far as we have been able to put the plan in operation in the field in the suppression and control of a large number of forest fires. In addition it has been of great educational benefit in serving to call the attention of the people to the large number of forest fires which occurred in the State and especially after such a long dry season as the past summer. While the statistics with regard to the number of fires, cause, etc., have not as yet been compiled, a casual survey of them is interesting in that it shows that the two chief causes of fires are the railroads and the carelessness of hunters.

"The demand for county forest wardens in the eastern part of the State has been greater than the ability of this office to supply such wardens with funds available. There does not, however, seem to be any question about the fact that the forest protective measures initiated by the State Board of Forestry meets a real need, that the work is meeting with the support of the timberland owners and other timber interests, particularly in the eastern section of the State where the large timbered areas are."

The biennial report of the State Forester is in the course of preparation and will be ready for the Legislature about January 1.

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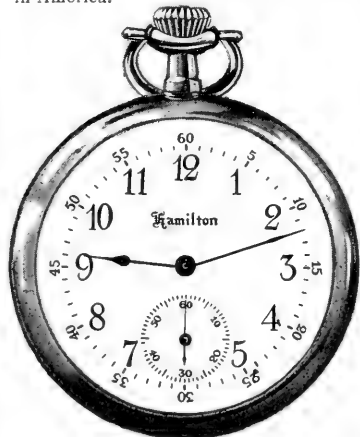
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American Forestry

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Vol. 20

MARCH 1914

No. 3

FORESTRY ON THE COUNTRY ESTATE
STATE FORESTS AS BIRD SANCTUARIES
BUSINESS MANAGEMENT OF WOODLOTS
A WOMAN AS A FOREST FIRE
LOOKOUT
UTILIZATION AT GERMAN SAWMILLS
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The Magazine of the American Forestry Association

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March	CONTENTS	1914
<hr/>		
FORESTRY ON THE COUNTRY ESTATE—By Warren H. Miller.....	165	
With seven illustrations.		
AMERICAN FORESTRY ASSOCIATION EXHIBITS.....	173	
A WOMAN AS FOREST FIRE LOOKOUT.....	174	
With eight illustrations.		
THE PLACE OF A FOREST SUPERVISOR IN THE COMMUNITY—By Paul G. Redington.....	182	
With two illustrations.		
BUSINESS MANAGEMENT OF WOODLOTS—By R. Rosenbluth, M. F.....	185	
With ten illustrations.		
UTILIZATION AT GERMAN SAWMILLS—By Nelson C. Brown.....	201	
With seven illustrations.		
FORESTRY ADDRESS TO STUDENTS—By Henry Sturgis Drinker.....	207	
STATE FORESTS AS BIRD SANCTUARIES—By William P. Wharton.....	211	
With twelve illustrations.		
BEST SEED YEAR FOR LONGLEAF PINE.....	221	
FOREST NOTES.....	222	
IMPORTANT FORESTRY LEGISLATION IN VIRGINIA.....	224	
FOREST FIRES CONTROLLED.....	226	
NEED OF A FOREST LAW IN SOUTH CAROLINA.....	228	
FIRE SEASON CLOSED.....	230	
LOBLOLLY PINE ADAPTED TO FORESTRY.....	231	
STATE NEWS.....	231	
CURRENT LITERATURE.....	234	

AMERICAN FORESTRY is published monthly by the American Forestry Association.
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Declaration of Principles and Policy of the American Forestry Association

- IT IS A VOLUNTARY** organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.
- IT IS INDEPENDENT**, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.
- IT ASSERTS THAT** forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.
- IT DECLARES THAT FORESTRY** is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars, worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.
- IT RECOGNIZES THAT** forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.
- IT WILL DEVOTE** its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies:

- FEDERAL ADMINISTRATION AND MANAGEMENT** of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.
- STATE ACTIVITY** by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.
- FOREST FIRE PROTECTION** by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.
- FOREST PLANTING** by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.
- FOREST TAXATION REFORMS** removing unjust burdens from owners of growing timber.
- CLOSER UTILIZATION** in logging and manufacturing without loss to owner; aid to lumbermen in achieving this.
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- EQUAL PROTECTION** to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.
- CLASSIFICATION** by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

American Forestry

VOL XX

MARCH, 1914

No. 3

FORESTRY ON THE COUNTRY ESTATE

III. FOREST OPERATIONS

By WARREN H. MILLER

LET us assume that you have in possession a large estate, have inherited therewith considerable woodlot property, and have determined to make a real forest of this, together with certain of your brambly and hilly pasture which figures out best as planted in pine and spruce forest.

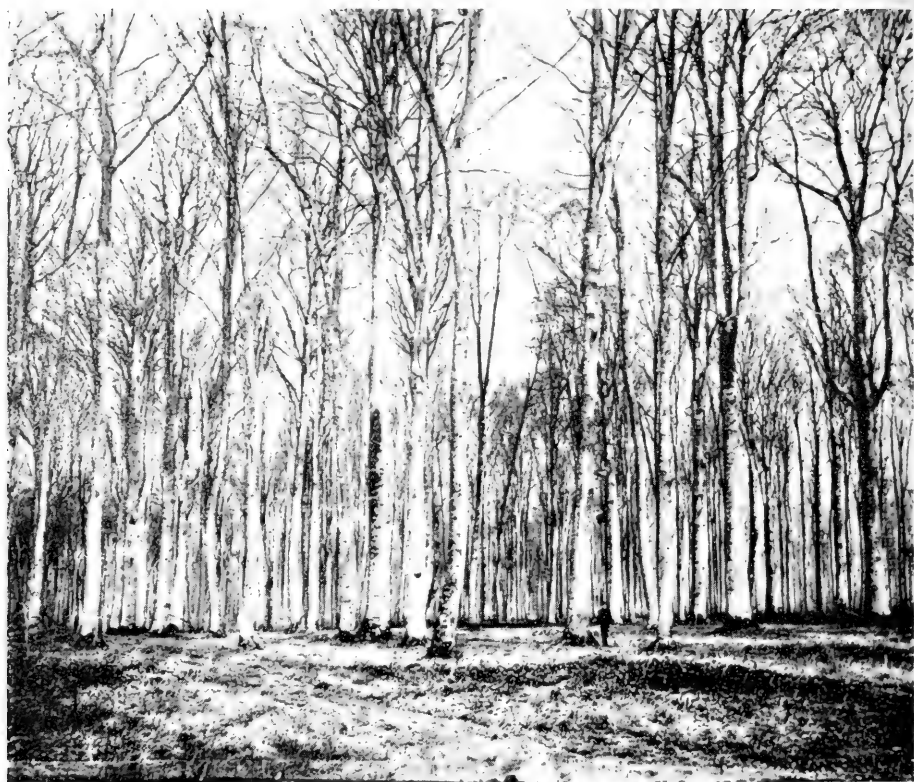
It is with the woodland that this article will chiefly deal, for it will be the sphere of your immediate forest activities, whereas the planted pasture had best be left with brush and grasses surrounding the young trees for several years to come, in order to protect them from the bitter winds and frosts of a bleak field in winter and the corresponding droughts in summer.

I am convinced that, for the converted woodlot of either hardwood or evergreen timber, the French system of forestry will appeal to American property owners rather than the characteristic German planted forest. I have studied forestry extensively in both countries and know whereof I speak, wherefore it is with conviction, based on intimate studies of our American conditions in surrounding forests, that I feel that for American private parks and wooded estates the French standard forest treatment will give the most satisfactory results, more particularly on the aesthetic side. For that reason nearly all the illustrations of this article are from representative French practice, in such famous forests as Compiègne, Bellême, Bercy, Eure, Gilley, etc.

If you are going into it purely for commercial ends, by all means raze your fine stands of hardwoods and plant

valuable white pines in orderly rows for all the world like an Iowa cornfield—you will come out ahead commercially, in fifty years! But I assume that the estate owner wants to enjoy his forest *now*, is already well on in years, and would like to start in at once to make the wooded part of his place a pleasure to roam in and yet profitable in that it yearly more than pays for its upkeep in cord wood, lumber and forest products. And to this end a combination of the French standard and selective forest systems seems peculiarly adapted.

The French standard forest provides a regular yield per year of mature timber, section by section; and a natural reproduction of each section in pure stands of trees at the end of its revolution, over the whole forest, one section coming mature each year and being self seeded before cutting. In the selection system, trees are taken out here and there when ripe, depending on their neighbors to replace the tree by natural seeding. The standard system gives the better yield at the least cost, and if there are eighty sections in the forest one ripe section is cut every year besides seeding cuts and secondary cuts on the adjacent sections. There is also a regular series of thinnings to attend to on various sections, so that the life work of a standard French forest is a very active and profitable one. The system applies directly to our own woodlands, because we already have a stand of mature timber, some of it too old, some in the sapling state, but the majority of it strong, vigorous trees of ten to fourteen inch diameter, with a dense second growth of saplings underneath. Our



A PURE STAND OF BEECH.

BEECH IS OFTEN USED TO REGENERATE THE SOIL AFTER SEVERAL REVOLUTIONS OF OAK. FOREST OF EURE, FRANCE.

forests are, however, a terrible mixture, hardly any two adjoining trees being alike, though one or two tree species, such as oaks and maples, usually predominate.

Now, every section on a French forest is of trees all of the same species and all of the same age, though each section differs from the next in the age of the trees on it; yet none of it is planted nor ever will be, for, by an ingenious system of cutting, the complete regeneration of the section in the same species and in pure stand is obtained before all the old trees are cut off. Instead of taking off all the trees on a section at one cutting, a seeding cut is first made, that is, enough trees are taken to let in the sunlight on the forest floor. Now, every two or three years the forest has a heavy seed year throughout its life, but usually these seeds do not germinate

for lack of sun. A few do, as in a natural forest, for that is Nature's way of keeping up the species—thousands of seeds in order that one tree may survive to take the place of the parent tree. But, with the seeding cut, in comes the sun, and a large proportion of the seeds germinate and soon the forest floor is covered with a thick growth of young seedlings. These need at first shade, not because the young tree wants it but because the humid soil would soon dry out if only these little seedlings protected it from the sun. Three years later the young seedlings need more sun, and a secondary cut is made, letting in a very large amount of sunlight, in fact the remaining old trees do little but shade the young saplings and fill in any bare spots with their own seed. At the tenth year from the seeding cut the terminal cut is made, and all the old



WELL KEPT FOREST ROADS AND TRAILS.

THIS SHOWS A PURE OAK STAND IN THE FOREST OF COMPIEGNE, FRANCE. NOTE THE EXCELLENT CONDITION OF THE ROAD, WHICH IS TYPICAL OF GOOD FOREST MANAGEMENT.

trees are then marketed, leaving a new stand of young ten-year saplings on the section. In this way the reproduction has cost nothing; but, though this system was originally proposed and adopted in Germany, it did not become popular there, for it does not pay as well as the planted forest, because the trees are not as straight as if planted in rows, several years are lost in getting the reproduction, and the crop is harvested in three cuts instead of one. Today in Germany you will see but few of these forests except along the upper Rhine, but the system is very popular in France. It is destined to be used in American forest estates very extensively, being a change on the lines of least resistance, and will be made along with the planted evergreen forests on old waste land. Our problem, then, is how to change our rough-and-tumble woodlot into a standard forest, for by doing so you combine beauty and utility, keeping all the pleasurable aesthetic features, yet at the same time making something valuable out of what is at present but a mess of cord wood.

The first step is an inspection of your domain, with a view to ascertaining what are the dominant trees and their ages in the various parts of your forest property. In Chapter One of this series we looked over the property with an eye to preserving and accentuating its aesthetic beauties; now let us see what can be done towards organizing the forest into something of utility. Nature has already been trying to do something along the lines of the French standard forest, for her dominant species in each locality, that is, the trees that thrive best in your different conditions of soil moisture and exposure, have usurped most of the growing room, and the other species are struggling for a foothold. Some of these will be undesirable from a forester's standpoint and will have to be discouraged, others are just what you want and only need a little help and encouragement to form a section in themselves. The size of the section does not matter, within reasonable limits, that is, not too small to make a commercially profitable cutting; it is the age with which you are principally

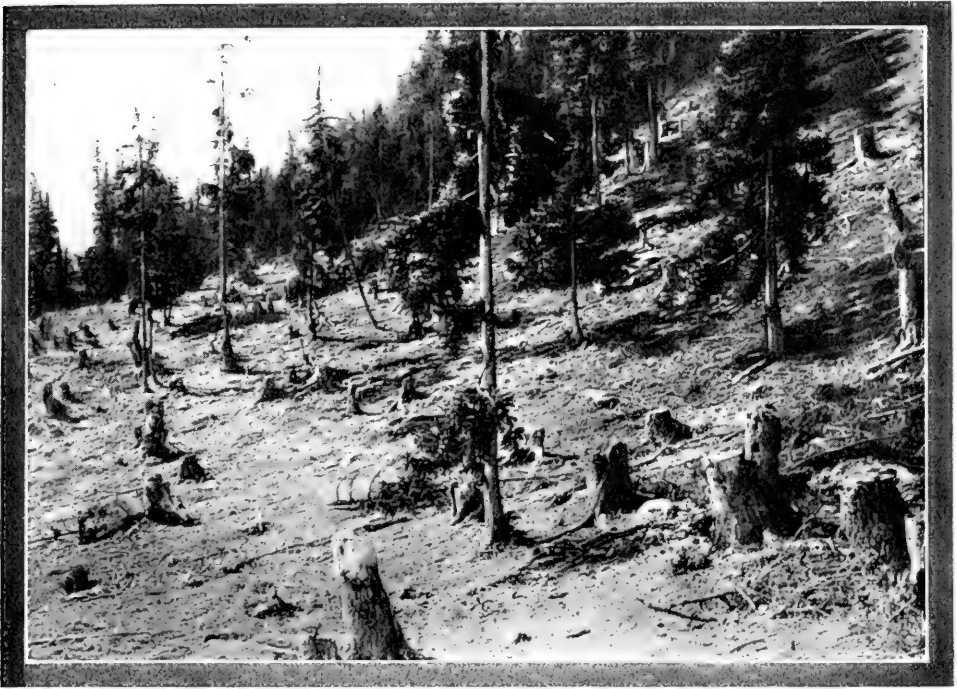
concerned. It is important to introduce a series of sections of as even ages as possible, and here also nature has been at work, for many localities will have a dominant age, that is, the major part of the trees will be approximately of an age. Here, for example, is a grove of maples, a regular sugar bush of them. Taking the places where they are thickest and other places where they still predominate there must be several acres of them. Further



HOW A FOREST FLOOR SHOULD LOOK.

SAPLINGS AND BRUSH CLEANED OUT AND TREES PROPERLY THINNED. FOREST OF GILLEY, FRANCE.

inspection shows that a little judicious thinning of undesirables will make that stand almost pure maple. Now, of course, one is not to run amuck with the axe here and take out everything that is *not* a sacred maple, there may be a fine white oak or several of them, and maybe one or two scenic trees which should be left in for their aesthetic value, but quite a few nondescript trees can come out to give the young maples under them a chance to come ahead. Such a "bush" usually wants thinning also, for young maples endure a lot of shade and are prone to get a good deal



TOO MUCH OF A SEEDING CUT

THIS SECTION WILL HAVE TO BE PLANTED. THE SEED TREES WERE LEFT TOO UNPROTECTED AGAINST BEING WIND-THROWN, TOO YOUNG AND TOO FAR APART. VOSGES, FRANCE.

too thick. Again, certain sections will have so many young maples in the underbrush that you had best take off the large mixed-species trees overhead, thus acquiring a young section of maples at nearly an age.

Here, in this high flat table-land, the white oaks have made a great showing. Cruising through your forest thereabouts you note that there appears to be either a small one or some big sturdy specimen about every few rods, in all there are enough of them to warrant making a section of white oak. First, we will take out everything that is palpably interfering with the growth of the white oaks already in the stand, after which we will look around to see what chance there is for a seeding cut in the neighborhood of the large seed-bearing white oaks which are scattered here and there in the section. Clearing away the general underbrush is a first step towards a good seeding cut, and the next consists in taking out undesirables that are at present keeping the sunlight off the forest floor. This must

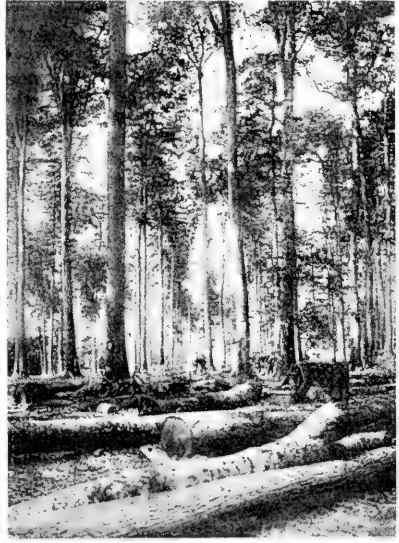
be done judiciously, not too much or you will have a husky epidemic of weeds, but with enough out to give sunlight from 10 a. m. to 4 p. m. you will find a thick fur of young oaks on that floor inside of two years. If this has been done pretty evenly all over the section you will wake up to the fact some day that here is a forest of young oaks, all of an age, growing up under the larger trees, which young oaks will demand more and more sunlight as they grow older, requiring more and more of the older trees to be taken out, and before you know it that section will be on the standard forest (*futaie régulière*) system.

A little further on we come to a big ravine of rich soil that is doing well in a natural forest of white pines, started by a few that the lumberman overlooked. For some reason of cross-pollenization, isolated specimens of white pine seldom set fertile seeds, and grow old and die without any colony of young ones coming up around them. But a clump of even a few of them pro-

ery and transplanted, or else transplanted from a commercial nursery in which root-pruning has been well attended to, the young tree is almost sure to succeed. These young saplings should go on not less than fifty-foot centers, for the capacity to produce nuts is directly dependent upon sunlight and general unhampered vigor. Needless to say all hindering trees are to be taken out.

After a look-over of the property we have in mind a rough plan of the make-up of the future forest, and can then lay out one of the most important items in it, the roads and trails. These should in general follow the boundaries of the various sections or rather the boundaries should be made by the roads, which are in turn determined by plane-table measurements and their utility in serving the various sections. You have lumber, cordwood, and forest products to take out (for none of them should be stored in the forest itself, since to do so is to invite an insect epidemic); there are saplings, seedlings, soil and spray-wagons to take into the forest, so practicable roads and trails that are reasonably negotiable to narrow-gauge wagons (such as the portable spray-pump) must be provided. Our photograph of the trail and road-crossing in the forest of Compiègne will give some idea of the pride the French take in such work. Eight feet width will answer for a forest road and the principal labors in connection with building it are taking out the trees in the way, stumping with dynamite, and grading through the duff to mineral soil. In general the trails will bound or lead through the small sections, and the main road will serve the larger ones directly, and the others indirectly by way of the trails. And, until such a road is built, you have no forest but just a brush patch, out of which nothing can be taken except in winter when the snow makes it possible for sleds to operate. These are all right and necessary for transient lumber operations, but for a permanent forest that is to be an active part of a country estate, a good system of roads and trails should be put in, as much as

on any other part of the farm. Of course the bulk of the lumber work will be done in winter, as there is no better solution of the winter labor problem on a big farm than to employ the men in active forest operations during the slack times of December and January; but there is a good deal of summer work to do also, such as planting, spraying and sugaring-off in the spring, and getting out nuts and cord wood from thinnings in the fall, so that good roads are by no means an expensive luxury; in fact, with-



A SEEDING CUT IN A PURE OAK FOREST.
NOTE THE SPACING OF THE SEED TREES REMAINING.
FOREST OF BERCY, FRANCE.

out them the forest degenerates into the inactive woodlot, where most of the products are let go to rot because it is too expensive to take them out to make it worth while.

I have spoken of the clearing out of underbrush incidental to a seeding cut. While, in certain French forests, the underbrush is allowed to remain for the sake of the leaf fall that it contributes to the general forest humus, I never could see any real gain in so doing. No one would think of running an orchard with all the ground space filled up with little trees and bushes, and



THE ADVANTAGES OF A GOOD ROAD.
SMALL FORCE GETTING OUT CORDWOOD IN SEPTEMBER IN THE FOREST OF GILLEY, FRANCE.

why do so in the forest where the growth of the big trees is the main point? A tree must have food for its roots and sunlight for its leaves; not one of them, but both. It cannot thrive if every foot of the forest soil is covered with saplings which contest for food with the big trees. The roots of the latter lie as close to the surface as the roots of the sapling. They all must abide where there is the warmth of the sun and air and the microbial growth in the humus to feed the roots. It is a fallacy to suppose that many of the main roots of a tree go far down into the mineral soil in search of food. There are several tap and anchor roots which go down deep for the purpose of withstanding the overturning effect of gales, but the big feeder roots spread right out about two feet or less below the surface, as anyone who has stumped many trees knows. Here they have a network of sapling roots to contend with, and if these latter are taken out, not only is the forest a much more open and pleasant place to walk about in but the big trees have much more room to put out new roots without robbing each other. You do not need saplings until the end of the revolution, when

you can get them quickly enough by a seeding cut. To clear out saplings and brush is something more of a problem than it looks, for a careless mattock-man is likely to cut off many an important root of a big tree in his efforts to clean up the forest floor. In my own forest a mattock man will grub and clear about 3,500 square feet of forest floor per day, and I found that the best way to insure my big roots not being cut was to take his axe away from him and let him use the mattock hoe alone. This tool has a broad blunt adze edge on one face, and a thin axe blade on the other. The latter is good enough to cut small roots and aid in uprooting bushes, but will glance off a large root. For clearing saplings the best procedure is to cut them out close to the root-collet and then grub up all those that sprout again the following year.

I know of two adjoining woodlots in the western part of my State, one of which has had the saplings cleared out and the other is still a dense tangle of underbrush; and there is no comparison in the vigor and value of the trees on the two lots. The one is almost all pure natural white oak, got by judicious thinning out of undesirables which

were formerly crowding these young oaks; the other is a big mixture, with about nineteen white oaks to the cruising mile, most of them choked and deformed by pin oaks and red oaks with their faster growth and bigger leaf area. The first woodlot is worth about twice as much as the second, just as it stands. It is really wonderful how quickly a tree will push out and fill all the available space you clear for it in a forest, for the natural crowding and competition is fearful and every tree is ready and equipped to take advantage of the least accident to its neighbors to get ahead and do some big growing. It is the crowding that keeps all our forest trees

about of a single height and diameter; most of them could do better if the others would give them a chance. This is the work that you must do with the axe to push along your desirable trees, and you will be surprised at the sudden increase in height and trunk diameter that follows a judicious thinning.

In our next chapter will be presented some details on private nurseries for special deciduous trees, and the best methods of combating the attacks of fire, fungus and insect enemies, as practiced in the forest of a large country estate.

(To be continued.)

AMERICAN FORESTRY ASSOCIATION EXHIBITS

THE American Forestry Association will have attractive exhibits of the work it is doing at the Forest Products Exposition, to be held in the Coliseum, Chicago, April 30th to May 9th and in the Grand Central Palace, New York, May 21st to May 30th.

Gradually the Forest Products Exposition is shaping itself definitely. Various associations are making more or less elaborate plans; large and small concerns are preparing for active demonstration of the value and merits of their wares and their specialties; the Forest Service of the U. S. Department of Agriculture is assembling a demonstrating exhibit that will probably be the most enlightening and interesting display of the sort ever given; the wood-working machinery people are polishing up the machines that in their operations will show the last degree of efficiency and mechanical advancement, and there is every reason to justify those in touch with the actual preliminary details in predicting one of the most representa-

tive, attractive and generally important industrial expositions ever given in this country. Special arrangements have been completed for the speedy yet unhurried transfer of the Chicago exhibits to New York; both expositions will be installed and handled by the same force of men; the moving picture exhibit in connection with both expositions will contain wonderfully accurate views of activities in every branch of the wood industry, a large attendance of manufacturers, producers, specialists, engineers, architects, contractors, builders, buying and selling forces, educationalists, the mechanical forces of the factory, the mill and the shop, organizations and individuals representing every branch of the industry and the great power, the home builder, street improvement voter, investor in improvements in building, the layman, the ultimate consumer, will go to Chicago and to New York to study the actualities and see the proofs and observe the multitude of things they never dreamed of, according to every indication.

In trying to find uses for blight-killed chestnut it has been found that it can not be utilized for crating stone; quarry owners say that chestnut wood leaves an indelible stain on the marble or granite.

Railroads caused nearly half the forest fires in Colorado and Wyoming last year, and almost one-sixth were set by lightning. In California lightning started more than half, with railroads a comparatively insignificant cause.

A WOMAN AS A FOREST FIRE LOOKOUT

ALL alone, 6,444 feet above sea level, on top of Klamath Peak in Siskiyou County, California, a young woman for months at a time during the prevalence of the forest fire season, did her part, and did it well, in the effort the Government is making to preserve the forests of the country from the destructive flames which have for years past caused an average annual property loss of twenty-five million dollars, and cost annually an average of seventy-five human lives.

She is Miss Hallie M. Daggett, and she is the only woman lookout employed by the Forest Service. Posted in her small cabin on top of the mountain peak it was her duty to scan the vast forest in every direction as far as she could see by naked eye and telescope by day for smoke, and for the red glare of fire by night, and report the result of her observations by telephone to the main office of the forest patrol miles and miles away.

Few women would care for such a job, fewer still would seek it, and still less would be able to stand the strain of the infinite loneliness, or the roar of the violent storms which sweep the peak, or the menace of the wild beasts which roam the heavily wooded ridges. Miss Daggett, however, not only eagerly longed for the station but secured it after considerable exertion and now she declares that she enjoyed the life and was intensely interested in the work she had to do.

Perhaps the call of the wild is in her blood. Her parents are pioneers, her father, John Daggett, having crossed the Isthmus in 1852 and her mother, a mere baby, being taken across the plains from Kentucky the same year. Miss Daggett was born at the Klamath mine, in the shadow of the peak on which the lookout station is perched. She spent most of her early years out of doors riding and tramping over the hills with her brother, so that it was natural that with her inborn love of the forests she should be anxious to take part in the fight which the Forest Service men are

making for the protection of the forests. Debarred by her sex, however, from the kind of work which most of the Service men are doing she saw no opportunity until lookout stations were established, and then after earnest solicitation secured the place she held so well.

Some of the Service men predicted that after a few days of life on the peak she would telephone that she was frightened by the loneliness and the



MISS HALLIE M. DAGGETT, THE YOUNG WOMAN WHO DID EFFICIENT WORK FOR THE FOREST SERVICE AS A FOREST FIRE LOOKOUT ON KLAMATH PEAK, CALIFORNIA.

danger, but she was full of pluck and high spirit, and day after day as her keen eyes ranged the hills which constitute the Salmon River watershed and as she made her daily reports by telephone she grew more and more in love with the work. Even when the telephone wires were broken and when for a long time she was cut off from communication with the world below she did not lose heart. She not only filled the place with all the skill which a trained man could have shown but she



IT WAS ON THE VERY TOP OF KLAMATH PEAK THAT MISS DAGGETT WAS STATIONED.
CLUSTERED NEAR THE FOOT ARE THE HOUSES AT KLAMATH MINE, WHERE MISS DAGGETT WAS BORN. MILES UPON MILES OF FORESTED
HILLS CAN BE SEEN FROM KLAMATH PEAK.



EDDY'S GULCH LOOKOUT STATION ON TOP OF KLAMATH PEAK WHERE MISS DAGGETT WAS STATIONED FROM JUNE 1 TO NOVEMBER 6 LAST YEAR.
THE ELEVATION IS 6,444 FEET.

desires to be reappointed when the fire season opens this year.

The story of her experiences she has told for AMERICAN FORESTRY and here it is:

"My earliest recollections abound with smoke-clouded summer days and fires that wandered over the country at their own sweet will, unchecked unless they happened to interfere seriously with someone's claim or woodpile, when they were usually turned off by back firing and headed in another direction, to continue their mischief till they either died for lack of fuel or were quenched by the fall rains. Such being the case, it is easy to see that I grew up with a fierce hatred of the devastating fires, and welcomed the force which arrived to combat them. But not until the lookout stations were installed did there come an opportunity to join what had up till then been a man's fight; although my sister and I had frequently been able to help on the small things, such as extinguishing spreading camp fires or carrying supplies to the firing line.

"Then, thanks to the liberal mindedness and courtesy of the officials in charge of our district, I was given the position of lookout at the Eddy's Gulch Station in the fourth District of the Klamath National Forest; and entered upon my work the first day of June, 1913, with a firm determination to make good, for I knew that the appointment of a woman was rather in the nature of an experiment, and naturally felt that there was a great deal due the men who had been willing to give me the chance.

"It was quite a swift change in three days, from San Francisco, civilization and sea level, to a solitary cabin on a still more solitary mountain, 6,444 feet elevation and three hours' hard climb from everywhere, but in spite of the fact that almost the very first question asked by everyone was 'Isn't it awfully lonesome up there?' I never felt a moment's longing to retrace the step, that is, not after the first half hour following my sister's departure with the pack animals, when I had a chance to look around. Of course I had been



ON MANY A DAY MISS DAGGETT VIEWED THIS SCENE, THE PEAK BEING ABOVE THE CLOUDS,
THE VIEW IS TOWARDS THE SOUTH WHERE LIES TRINITY COUNTY. PACKERS PEAK IS AT THE EXTREME LEFT.

on the peak before during my early rambles, but had never thought of it as a possible home. One of my pet dreams had always been of a log cabin, and here was an ideal one, brand new the summer before, and indoors as cozy as could be wished; while outdoors, all outdoors, was a grander dooryard than any estate in the land could boast; and, oh, what a prospect of glorious freedom from four walls and a time clock!

Klamath Peak is not really a peak in the conventional sense of the word, but as can be seen from the picture, is rather the culmination of a long series of ridges running up from the watersheds of the north and south forks of the Salmon River. Its central location in the district makes it, however, an ideal spot for a station. I can think of no better description of it than the hub of a wheel with the lines of ridges as spokes, and an unbroken rim of peaks circling around it; some eternally snow capped, and most all of them higher than itself.

"To the east, a shoulder of snowy Shasta and an unseen neighbor lookout on Eagle Peak; further to the south, the high jagged edge of Trinity County and, just discernible with the glasses, a shining new cabin on Packers Peak; in the west, behind Orleans Mountain with its ever watchful occupant, a faint glimpse of the shining Pacific showing with a favorable sunset; and all in between, a seeming wilderness of ridges and gulches, making up what is said to be one of the finest continuous views in this western country.

"However that may be, it was certainly a never-ending pleasure to search its vast acres for new beauties at every changing hour, from sunrise to sunrise again.

"Added to the view was a constantly spreading, gaily tinted carpet of flowers to the very edges of the snow banks. These all summer and then the gorgeous autumn coloring on the hillsides later on, when the whole country seemed one vast Persian rug.

"Bird and animal life was also very plentiful, filling the air with songs and chatter; coming to the doorstep for food, and often invading the cabin

itself. I positively declined owning a cat on account of its destructive intentions on small life,—a pair of owls proving satisfactory as mouse catchers, and being amusing neighbors as well. Several deer often fed around evenings; there was a small bear down near the spring, besides several larger ones whose tracks I often saw on the trail; and a couple of porcupines also helped to keep from being lonesome, by using various means to find a way into the cabin at night.

"All these animals being harmless, it had never been my custom to carry a gun in so-called western fashion, until



THE ARRIVAL OF THE VERY NECESSARY WATER SUPPLY, SHOWING THE METHOD BY WHICH SUPPLIES WERE TAKEN TO THE TOP OF THE MOUNTAIN WHERE MISS DAGGETT WAS STATIONED.

one morning I discovered a big panther track out on the trail, and then in deference to my family's united request, I buckled on the orthodox weapon, which had been accumulating dust on the cabin shelf, and proceeded to be picturesque, but to no avail, as the beast did not again return.

"At many of the stations the question of wood and water is a serious one on account of the elevation; but I was especially favored, as wood lies about in all shapes and quantities, only wait-



HERE IS A JANUARY SCENE FROM THE LOWER RIDGES OF KLAMATH PEAK.

ing for an ax to convert it into suitable lengths; and water unlimited could be melted from the snow banks which lingered until the last of July, although it did seem a little odd to go for water with a shovel in addition to a bucket. Later the supply was packed in canvas sacks from a spring about a mile away in the timber. This was always a job sought for by anyone coming up on horseback; and thanks to the kindly efforts of the guards who passed that way, and my few visitors, it was always easy to keep the kettle boiling. So I did not need a horse myself, there being, contrary to the general impression, no patrol work in connection with lookout duties, and my sister bringing up my supplies and mail from home every week, a distance of nine miles.

"The daily duties of life on top were small, merely consisting of an early morning and late evening tramp of half a mile to the point of the ridge where the trees obscured the north view from the cabin; and a constant watch on all sides for a trace of smoke, a watch which soon became a sort of instinct, often awaking one in the night for a look around; for I soon came to feel that the lookout was, what one friend so aptly called it, 'an ounce of prevention.' Then there were the three daily reports to the district headquarters in town, to prove that everything was serene, also the extra reports if they were not; and a little, very little, housework to do.

"Taking it all in all, not a very busy day, as judged by modern standards of rush, but a lookout's motto might well be 'They also serve who only stand and wait,' and there was always the great map spread out at one's feet to study by new lights and shadows while waiting, and the ever busy phone with its numerous calls, which must be kept within hearing, so one could not wander far.

"That phone, with its gradually extending feelers through the district, made me feel exactly like a big spider in the center of a web, with the fires for flies; and those fires were certainly treated to exactly the speedy fate of the other unworthy pests. Through

all the days up to the close of the term on November 6th, when a light fall of snow put an end to all danger of fires, there was an ever growing sense of responsibility which finally came to be almost a feeling of proprietorship, resulting in the desire to punish anyone careless enough to set fires in my dooryard.



A TREE NEAR MISS DAGGETT'S CABIN WHICH WAS STRUCK BY LIGHTNING.

It was the same stroke of lightning which caused the lightning arresters to burn out and cut Miss Daggett from telephone communication with the main fire patrol station.

"The utter dependence on the telephone was brought vividly to my mind one afternoon, soon after my arrival, when an extra heavy electrical storm which broke close by caused one of the lightning arresters on the outside of the cabin to burn out, quite contrary to precedent, and I was cut off from the world till the next day, when someone from the office came up in haste to find out the cause of the silence and set things aright. They often joke now about expecting to have found me hidden under some log for safety, but it wasn't quite so funny then.

"However, there seems to be very little actual danger from these storms,



MISS DAGGETT ON HER PET HORSE AT THE HIGHEST POINT OF
KLAMATH PEAK, LOOKING NORTH.

in spite of the fact that they are very heavy and numerous at that elevation. One soon becomes accustomed to the racket. But in the damage they cause starting fires lies their chief interest to the lookout, for it requires a quick eye to detect, in among the rags of fog which arise in their wake, the small puff of smoke which tells of some tree struck in a burnable spot. Generally it shows at once, but in one instance there was a lapse of nearly two weeks before the fall of the smouldering top fanned up enough smoke to be seen.

"At night the new fires show up like tiny candle flames, and are easily spotted against the dark background of the ridges, but are not so easy to exactly locate for an immediate report. Upon the speed and accuracy of this report, however, the efficiency of the Service depends, as was proven by the summer's record of extra small acreage burned

in spite of over forty fires reported.

"To the electrical storms are easily attributed most of our present-day fires, as traveler and citizen alike are daily feeling more responsible for the preservation of the riches bestowed by nature, and although some still hold to the same views as one old timer, who recently made the comment, when lightning fires were being discussed, 'that he guessed that was the Almighty's way of clearing out the forest,' the general trend of opinion seems to be that man, in the form of the Forest Service, is doing an excellent work in keeping a watchful eye on the limits of that hitherto wholesale clearing. A good work and long may it prosper, is the earnest wish of one humble unit, who thanks the men of the Service one and all, for the courtesy and consideration which gave her the happiest summer of her life."

Minnesota has a forested area of 28 million acres, the largest of any State east of the Rocky Mountains.

There are approximately four million acres of timber land in New Hampshire of which about half is in farmers' woodlots.

Forest fires in the United States have caused an average annual loss of 70 human lives and the destruction of 25 million dollars worth of timber.

Juniper from the Indian reservations of New Mexico and Arizona may prove an excellent source of material for lead pencils. Manufacturers are searching the world for pencil woods.

THE PLACE OF A FOREST SUPERVISOR IN THE COMMUNITY

By PAUL G. REDINGTON

Forest Supervisor Sierra National Forest, California

IN the United States there are 150 Supervisors in direct charge of the work on the various National Forests. These men have administrative jurisdiction over approximately 160,000,000 acres of public property. They are in responsible positions and are chosen because of their fitness to handle successfully the work on their Forests, and their ability to deal fairly with the thousands of people who use the Forests.

Of these 150 Supervisors, 117 (by a very conservative estimate) are located in towns or small cities where they should be known to the large majority of the members of the communities. Laying aside a consideration of their official relations with certain individuals in each community, their potential influence by active participation in movements looking towards "community up-building" is very large.

It is my conviction that every Supervisor has a splendid chance to make his place as an individual just as prominent in his community as his official position is prominent among other occupations of the locality.

The personality of every man in this position, his ability to mix with his fellows, and to take the leadership in community development work, of course will have a great deal to do in fixing his place in his home town. Assuming, however, that the average man is well qualified in these particulars, what ought he to do to make his community the better for his being a member of it?

Education is at the bottom of community progress, just as much as it is the foundation stone of all progressive development. A Supervisor should not hesitate to take an interest in all educational questions, particularly those having to do with the betterment of the grammar and high schools in his community. He should, when asked to do so by the voters, accept a position on

the local school board. He should attend public school exercises and be willing to give talks to students, whenever invited to do so. Incidentally, by getting into the school activities in any of these ways he is helping out his profession.

A Supervisor should be willing to go before the county officials to aid school work and development, if he thinks his influence can assist. Western counties are going farther each year in the placing of branch libraries in the mountain towns and settlements, and a Supervisor can find in this an additional channel through which to direct his unofficial activities.

A Supervisor should not fail to take a positive stand which will align him on the right side of all things which have to do with raising the moral tone of the community and he should not be backward about expressing an opinion if he thinks good can be accomplished. Without going into the pros and cons of the liquor question, it is my belief that every Supervisor who lives in a small isolated place where adequate regulation of saloons is not possible, should actively advocate their absolute abolishment in order to keep out lawlessness and in this way help in giving boys and young men the right start in life.

The benefit of church influence in any community is beyond question. Whether a Supervisor is a religious man or not, I think he ought to appreciate the benefit accruing from the location of a church in his home town, and if one is lacking, he should, on general principles, give his aid, financial and otherwise, towards its establishment.

Oftentimes, due to the comparatively small number of residents in a town where a Supervisor is located, and to the consequent uncertain practice, there is no physician. A competent medical practitioner is one of the most needed



MAIL CARRIER APPROACHING TETON PASS FROM THE EAST WITH ONE PASSENGER, MAIL AND EXPRESS.

Notice open slope where slides come and endanger the life of mail carriers and passengers. Lincoln County, Snake River, Teton National Forest, Wyoming. Forest Supervisors equipped with their horses and sled for Forest Service work are of much aid to citizens in this kind of country, especially in winter.

adjuncts of any community, large or small, and a Supervisor should identify himself with any movement which will bring a physician to his community, if one is lacking. This may be done best perhaps by offering a guaranteed salary; each member of the community agreeing to pay a certain amount of the salary at stated periods. Closely allied to this, are the questions of proper sanitation and water supply of towns, and in these I think every Supervisor should take an active interest.

Other community problems, such as the beautifying of streets, the placing of shade trees, the cleaning up of debris,

the extinction of insect and rodent pests, are all locally important, and a Forest Supervisor is just as well qualified to take an important part in the proper solution of these problems as any other citizen.

I can see no objection to a Supervisor serving, without pay, as a member of his town council or board of alderman, if by doing so he can help out the community. There may be official objection to this, but if it exists, I do not know of it. Where a community is very small and no town council or similar body exists, a great deal of community work can be done through



THIS SHOWS THE DIFFICULTIES OF TRAVEL BY FOREST OFFICERS OR ANYONE MAKING A WINTER TRIP TO JACKSON, SNAKE RIVER, TETON NATIONAL FOREST, WYOMING.
The horse is down as a result of soft roads.

improvement leagues, and there is every reason, in such cases, for a Supervisor to take an active interest in the organization of such bodies. Through the medium of such, a great deal can be done to elevate the social atmosphere of the community by arranging for simple entertainments, dances, moving picture shows, etc.

A Supervisor should be posted on such topics as life, fire and accident insurance, and should not be backward in urging his neighbors to protect themselves and their property through this medium. He should take an interest in farm credits, particularly if he is in a community where agriculture is an important industry. Oftentimes, associations of individuals can secure better prices on the necessities of life than any individual working alone could, and a Supervisor may in many places have a chance to help in the formation and successful operation of a cooperative buyer's association. In the development of the rural free delivery and the introduction or extension of means of communication, a Forest Supervisor should actively participate.

Good roads constitute perhaps the most tangible asset a locality can possess, and every Supervisor should know what a good road is, and should work

with his neighbors to secure funds from the counties and states, wherever new roads are needed or the improvement of old roads is essential. Officially, a Supervisor in these days must know something about roads, since 10 per cent of the annual receipts from the National Forests is now devoted to co-operative road and bridge projects in the counties in which the Forests are located. With this knowledge the Supervisor should be particularly qualified to take the lead in this line of community activity.

I have touched on a few things which have occurred to me, mainly because I have been fortunate enough to rub up against some of them. Undoubtedly every Supervisor has had the same experience. In fact, I will go farther and say that probably every permanent Forest officer—and there are over 2,000 of them—has had the chance to take a concrete interest in many of the lines of community development work, concerning which I have spoken, and my suggestions therefore can be taken as applying to them, as well as to merely the Supervisory force.

We all know that there is a strong tendency all over the country to improve the conditions of country life, and I sincerely believe that we ought to do our share

BUSINESS MANAGEMENT OF WOODLOTS

FOR THE INSTRUCTION OF OWNERS OF FARMS AND COUNTRY ESTATES

By R. ROSENBLUTH

Director of Forest Investigations, New York Conservation Commission

THE ordinary woodlot owner has only a very indefinite idea of what his woodlot is worth, or how best to market the product.

In cases where he sells the cordwood only, he may know about what it is worth as cordwood, but rarely does he figure whether he could not greatly increase his revenue by selling each tree to the best advantage. Thus, for instance, strange as it may seem, I know of some farmers who are still cutting black cherry for railroad ties—and this in a district near large furniture factories.

In selling a lot of mature timber, the general practice is to sell "by the lot," receiving a stipulated sum for all the wood on the tract. This arrangement is one which practically always works out to the benefit of the buyer rather than to the owner of the woodlot, as buyers generally figure on at least a 25 per cent margin.

Not only is this true of the value of the material cut, but the owner's greatest loss lies rather in the fact that no provision can be made to save any desirable trees for a second crop. The buyer paying a fixed sum for everything in the lot, will "skin" every stick that will yield any profit, and will take no care of young growth which he cannot use, so that what is left to the owner of the woodlot is, indeed, a very poor tract of woods.

Many buyers of such timber lots would prefer to buy and pay for only the mature, or at least the larger trees, leaving material for a second cut within a few years; but when they buy by the lot, they naturally continue the old skinning method.

BETTER METHODS OF SELLING.

It is thus seen that the owners of woodlots should at least abandon the

outright sale of all the wood "by the lot," and sell by the unit—so much per thousand feet of lumber; so much per pole, etc.; based on the quantity actually cut, or estimated to be standing on the tract, and should stipulate that great care be used to prevent undue injury to young growth (with a fine attached for trees carelessly broken), and that trees below certain diameters be left, as well as a few selected individuals of trees above those diameters, which may be marked.

The best results will be obtained by having the work done directly by the owner. Where this is impossible, it should be done under his supervision, or with frequent inspection by a trustworthy representative.

Contract work in the woods should be guarded by carefully drawn provisions regarding all the important features of the work. These should be put in the form of a written contract, signed by both parties.

In a complete detailed contract, provisions should be included, in detail under the headings of timber to be cut; provisions against waste; protection against damage; location of camps and mill site, etc.; measurements; payments; faithful performance; disputes; duration of contract.

ESTIMATING THE STAND OF TIMBER.

In cases where the product sold is based on the actual amount cut, it is not necessary to know the amount standing before the cutting is done, in order to make a fair contract for payment. However, in management it is very desirable to know just how much of each kind and size of trees is standing in the woods, in order to base calculations as to the amount which may be cut at any time, and still leave a definite amount for future cuts; to place intelli-



SHOWING A RHODE ISLAND WOODLOT CUT OVER AND THE CORD WOOD NEATLY STACKED AND READY FOR TRANSPORTATION.



SCENE AT A PORTABLE SAWMILL USED IN NEW YORK STATE THROUGHOUT THE WINTER.
NOTE SIMPLICITY OF ITS ARRANGEMENT.

gently a value upon the woodlot; and to know how and where best to market the product and to make contracts for cutting.

Various methods of estimating the stand of timber are in vogue. It must be remembered that to make an accurate estimate requires skill and experience, and if the woodlot is of valuable material and good size, it will pay best to hire a forester to make the estimate. He can, at the same time, make a plan for the best method of management. This will save money on such lands.

In the woodlot the area is generally so small that the owner could go through it and count all the trees, and determine just what an average-sized tree would be; find the contents of that average-sized tree; and multiply that by the total number of trees. Or, he could estimate the contents of each tree separately. Unless the woodlot is very small, it would be more practicable to determine the number of trees of each inch class of diameters; find the volume of the average tree of each diameter class, multiply the volume of the average tree of each diameter class by the number of trees in that class, and add together the volumes obtained for each class and thus secure the total volume on the whole area.

In estimating by diameter classes, it is generally the custom to take the

diameter of trees at breast height, or four and one-half feet from the ground, in order to be above the root swellings, which vary with individual trees. In measuring diameters an average diameter is taken. Where all the trees are counted, it is best to mark them in some way as they are counted, in order to avoid counting any of them more than once. Plain chalk can be used.

A very useful instrument for measuring the diameters is a pair of calipers, constructed so that one beam is fixed at right angles to the end of a graduated stick, while the other slides along the stick. When the movable beam is pressed against the tree, it stands at right angles to the scale; and the diameter in inches, read off on the scale, gives the diameter of the tree.

THE USE OF VOLUME TABLES.

Based on such measurements at breast height, a large number of tables showing the volume of trees of different diameters has been constructed. Where such a table can be found, all that is necessary to complete the estimate, after determining the number of trees of each given diameter class, is to look up in the table for a given species the volumes of trees of the same diameter and average height, and to use the volume there given. Where no volume table exists, it will be necessary to deter-



SHOWING THE METHOD OF MEASURING TIMBER BY THE SHIP METHOD AS DESCRIBED BY R. ROSENBLUTH WITH THE SUGGESTION THAT IT MAY READILY BE USED ON LARGE SIZED WOODLOTS.

Courtesy Prof. A. S. Pickmore.



SHOWING A WOODLOT RECENTLY CUT AND UPON WHICH STRAIGHT THRIFTY WHITE OAKS HAVE BEEN LEFT BECAUSE THEY WILL YIELD LARGER RETURNS WHEN THEY REACH TIMBER SIZE.

mine the actual contents of at least a few trees in each diameter class. This may be done by selecting trees of as nearly average form as can be found; cutting them down and then working them in such a way as would be done for the market. Then each log, if logs are cut, can be scaled separately, with the ordinary log rule used for scaling logs in that district, and the total board foot contents thus determined. Cordwood, ties or poles may be estimated

either by working the tree into those products and determining the actual amount thus obtained; or by determining the solid cubic foot contents, and allowing such converting factors, as for example, ninety cubic feet to one cord of wood. Where the cubic contents are measured, the diameter of each piece is measured at both ends, and the average diameter is taken; the area of a circle of that diameter is found, and that area multiplied by the length of

the piece. The volume of the piece is the result. The sum of the volumes of each piece gives the volume of the tree.

However, in actual practice, it will seldom be practicable or necessary to make such a volume table. It will be easier either to use the volume tables already constructed, or to determine the contents of average trees by actually working them into the finished products, and by measuring the amounts of those products.

The best volume tables give volumes for trees not only of certain diameter classes, but also for different heights of each diameter class, because the volume of trees varies, not only with the difference in diameter, but also largely with the difference in height. That is, a tree of four inches in diameter at breast height, that is twenty feet high, will have a very much lower volume than a tree four inches in diameter and fifty feet high.

It is then necessary in estimating, either to record each tree separately as to diameter and height, or to find the average height of trees in each diameter class. A simple way of determining height is to place a ten-foot pole alongside of the tree, and, stepping off to a convenient distance from the tree, figure the height by eye, comparing the height of the tree with the ten-foot pole.

METHODS IN LARGE WOODLANDS.

Where the area is too large to measure all the trees, or where time does not permit it, various short cuts to an estimate may be used.

One convenient way when the area of the woodlot is known, is to measure off some definite portion, such as one acre or five acres, determine the amount standing on this small area according to the methods described before, and multiply the amount on this area by the figure which shows the proportion between the small area, and the whole. That is, if the small area is five acres, and the whole one hundred acres, multiply the volume on the small area by twenty.

Good judgment must be used in order to select these sample plots that

they shall be representative of the whole area. It may be convenient to know that a plot of 208 feet square makes an acre; or that a circular plot with a radius of 85 feet is a half acre.

In still larger areas, where it is difficult to select sample plots which would be fairly representative of the whole stand, it is often convenient to run strips at fixed intervals through the stand. All the timber on these strips is estimated and multiplied by the number of times the strips are contained in the total area. Strips should always be run at right angles to the main slopes; that is, up and down hills, rather than along them. Where very noted changes in the type of forest occur, the amounts in each type on the strips should be estimated separately, and the estimate applied to the area of each type.

It will be seen from this that in using these methods it is necessary to know at least the total area of woodland, and it is much better also to know the area of each type. This involves the mapping of the area.

It is not possible to describe here the way to make such forest maps. Unless the area is very large, or a very accurate map is wanted, a fairly good map may be made by the use of an ordinary hand compass, and by pacing, or else by chaining distances.

In estimating strips, it is most convenient either to take $16\frac{1}{2}$ feet on each side of the line run, or 33 feet on each side. Then, for every chain (66 feet) forward along the strip, in case where $16\frac{1}{2}$ feet on each side of the line has been taken, one-twentieth of an acre has been estimated; where 33 feet on each side of the line, one-tenth of an acre; for every tally of 10 chains (66 feet) in the wider strip, an acre has been estimated; in the smaller, one-half acre.

It is best to tally each acre separately; and where the line ends before a whole acre has been estimated, the number of chains should be noted, and that fraction of an acre used for the strip estimated, rather than continuing on the same sheet back on another line.

Strips sixty-six feet wide, run one-quarter mile apart, will give an estimate



A DENSE BORDER AROUND THE FARM WOODLOT WHICH PREVENTS THE WIND FROM BLOWING AWAY THE LITTER AND INSURES FAVORABLE FOREST CONDITIONS.



A TYPE OF A PORTABLE SAWMILL WHICH AT SLIGHT EXPENSE MAY BE SHIFTED FROM PLACE TO PLACE AS IT IS NEEDED IN CUTTING A WOODLOT.

of 5 per cent of the whole area; one-eighth mile apart, 10 per cent of the whole area, etc.

In sample plots or strip methods of estimating, at least 5 per cent of the total area must be estimated in order to have accuracy in the result; but it will be better to estimate the stand on a greater percentage of the area. Generally an estimate of 20 per cent of the whole area would give a very accurate estimate for the whole stand.

THE MARKETS.

In order to know what a tract of timber is worth, it is necessary to know the value of the products. Not only should the general uses of the different kinds of wood be known, but careful attention should be given to any special use for given kinds or sizes of trees, which may result in increased value.

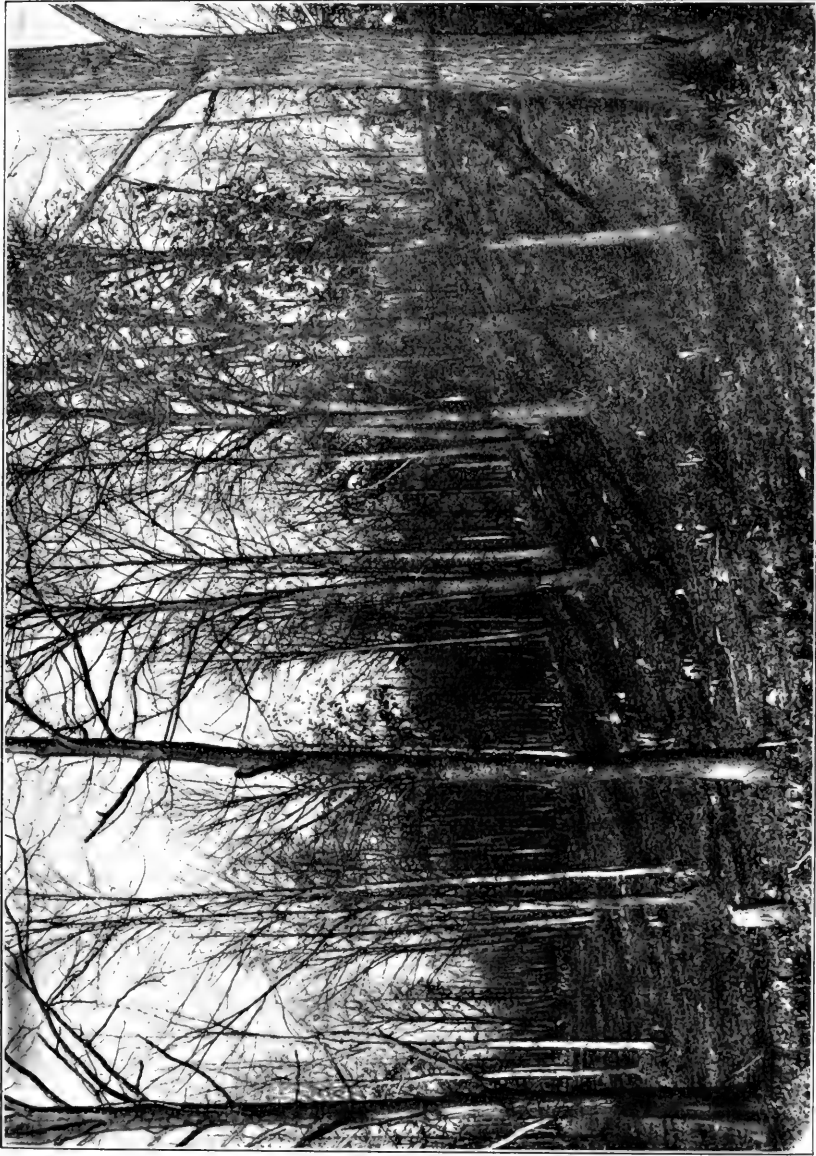
The market for woodlot timber is chiefly for ties, poles, firewood, posts, piles, rails, lumber, and very frequently in the round for pulpwood, acid factories, and box manufacturers; while special kinds, such as fine white oak, ash, second-growth hickory, cherry, etc., have a large number of special uses,

such as in the vehicle industry, furniture making, etc.

It is again urged that owners should be particular to inquire into their special markets, both for the different kinds of timber, and for the most profitable form into which given sized trees may be worked. By taking advantage of this, they can very frequently double the price received for their products.

Lumber is sawed from almost every kind of wood. The principal uses of several kinds are given later, together with the average price of each kind. Prices given show the average price at the mill per thousand board feet of lumber "log run," *i. e.*, the average of all the products sawed from the logs. The average value of the "log run" of lumber cut in most State woodlots is about \$25 a thousand feet board measure.

Poles are mostly of chestnut. All poles shall be of sound, live, white chestnut, squared at both ends, reasonably straight, well proportioned, from butt to top, peeled and knots trimmed to the surface of the pole. The dimensions of the poles shall be according to the following table: The "top" meas-



ANOTHER STAND ON WHICH THE MOST DESIRABLE TREES HAVE BEEN LEFT FOR FURTHER GROWTH AND FUTURE CUTTING.

urement being the circumference at the top of the pole. The "butt" circumference being six (6) feet from the butt.

Ties are usually 8 or 8½ feet long. First class ties are 7 inches thick and not less than 7 inches or over 12 inches wide at any place on the face, and must be hewed or sawed on two faces; sometimes allowed to be sawed on four sides, and then to be 7 inches by 9 inches. Second class ties are 6 to 9 inches thick, and with a face not less than 6 inches wide.

It is generally stipulated that not over 25 per cent of second class ties will be accepted on any contract. By far the most common woods used for ties are chestnut and the various oaks. Red oak is discriminated against, either fetching a lower stated price, or ties of first-class dimensions being considered as second-class white oak. The following prices may be taken as a fair average:

First Class Ties: Chestnut, 53 cents; White and other oaks, 65 cents; Red oak, 45 cents;

Second Class Ties: Chestnut, 47 cents; White and other oaks, 53 cents; Red oak, 41 cents.

Cordwood is generally sold by the cord in ranks eight feet long, of wood cut into sticks four feet long, and stacked to a height of four feet. Near towns, however, it is very frequently cut into shorter lengths, such as twelve or eighteen inches, so as to be of stove size; but this generally fetches almost the same price as four-foot pieces, on account of the extra convenience to the user.

Cordwood for firewood is worth about \$4 per cord for chestnut and similar woods; \$5 for oak, and \$6 for hickory. Poplar and spruce cordwood for pulp or excelsior, is worth about \$8.50 at the mill.

Charcoal is worth from six to ten cents a bushel.

USES OF PRINCIPAL KINDS OF WOODS, AND PRICES.

The most important general and special uses of our most important woods and average value "log run" for each kind, under average woodlot con-

ditions, is given below and should prove very useful. Average "log run" values are considerably below the value where used for some special purpose. The owner therefore should always look for the very best market for his product; and for that product most in demand and yielding the greatest profit.

White ash is used mostly for agricultural implements, vehicle stock, furniture, basket veneer, and many special uses. Good white ash is especially valuable, and should always secure a special market.

Black ash is rather less valuable than the white ash and is used mostly in veneer stock, for baskets, etc. The average price is about \$21.50 per thousand feet of lumber, although it frequently reaches \$40 per thousand or more.

Aspen is generally sold by the cord. The average price is about \$8.50 per cord at the mill. Its common uses are for excelsior, pulp, boxes, crates, veneer baskets, etc. Popple brings about the same price, and used for the same purposes.

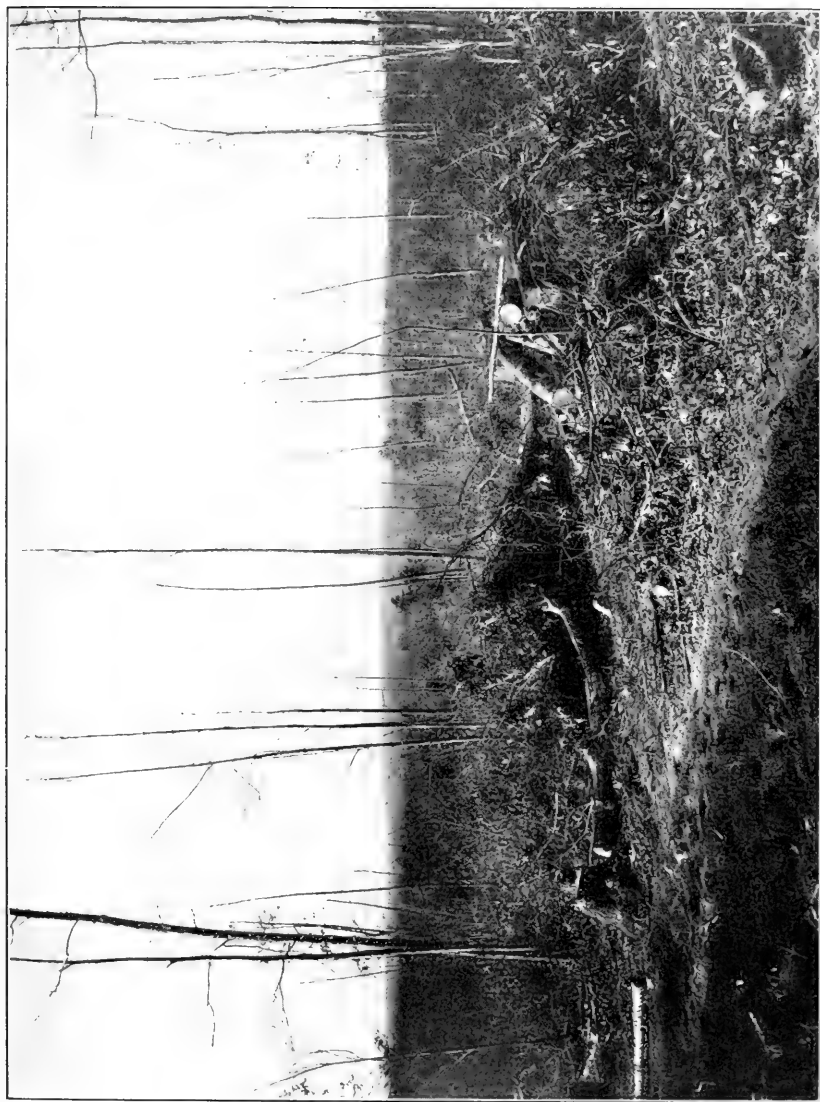
Basswood is generally sold for lumber of the better grades, and special stock is used mostly for vehicles, in furniture, for veneer stock, etc. Its average price is about \$21.00 per thousand feet.

Beech is sold mostly for lumber and cordwood. Its average price is about \$14.50 per thousand. Its main use is for agricultural implements, furniture, and novelties, such as clothes pins, wooden blocks, musical instruments, etc.

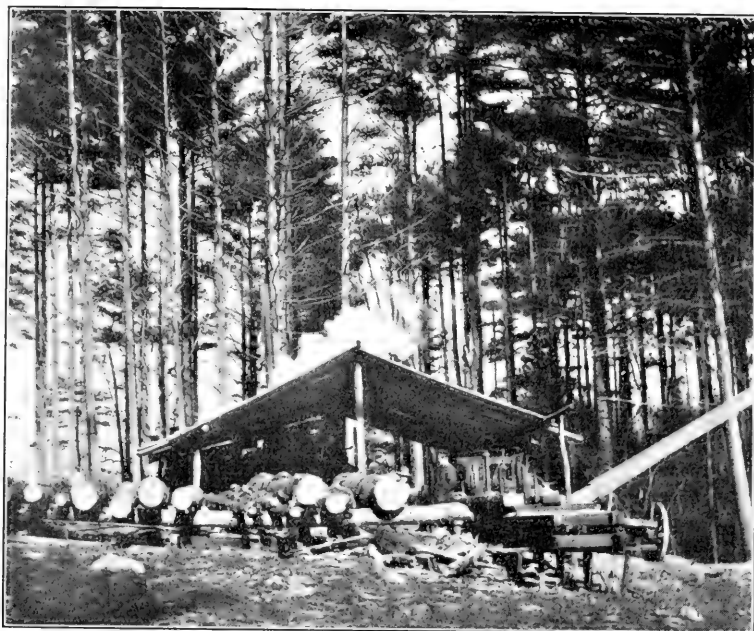
Birch is sold for lumber or cordwood at an average price of about \$20 per thousand feet. Its main uses are for furniture, and veneer stock, and for interior finish. This wood is often stained and used as a substitute for mahogany. Good birch logs should always command a special price.

White birch and paper birch very seldom grow to sizes large enough to warrant use for lumber, and are mostly used for cordwood; and for wooden novelties, such as clothes pins, tooth-picks, spools, etc.

Cedar is used mostly in the round for posts and poles. The red cedar



ON THIS TRACT THERE HAS BEEN A CLEAR CUTTING OF TIMBER.
IT WAS A 50-YEAR STAND OF MIXED HARDWOODS—CHESTNUT PREDOMINANT. THE SLASH AND STANDING SMALL TREES
ARE BEING CUT FOR CORDWOOD.



ANOTHER VIEW OF A PORTABLE SAWMILL.
NOTE THE SIZE OF THE LOGS.

very seldom grows larger than post size. The white cedar makes poles as well as posts, and shingles and lumber are made from it. Its average price is \$24 per thousand feet.

Cherry is mostly used for fancy furniture. Any tree which will yield a good log should be worked into furniture stock, and should always command a special price for this purpose. Its average price is \$30 per thousand feet.

Chestnut is used mostly for cordwood, ties, telephone poles and piles, and also very largely for bridge and car construction and furniture, and a large variety of miscellaneous purposes. The average price is about \$19 per thousand feet.

Elm is also a wood with a large number of special uses for which it has a special value.

The white elm is the best of the elms. It is used mostly for cooperage stock, vehicle stock, and in such implements as wheelbarrows, etc., where especially strong wood is desired. Its average log run price is now \$23 per thousand feet.

Hemlock is sold mostly for ordinary

lumber and pulp. It is rather an inferior wood. The average price is \$15.75 per thousand feet.

Hickory is used mostly for agricultural implements, tools, vehicle stock, etc. Good hickory is growing scarcer and scarcer and should always command a special price. Frequently trees are worked up into cordwood or other inferior products which should be left to grow lumber. The average price is \$25 per thousand; although hickory finds a ready market up to \$60 per thousand feet. Hickory cordwood brings about \$6 per cord.

Locust is used mostly for posts, ties, insulator pins, etc. The average price is \$20 per thousand feet.

Maple is used mostly for furniture and fancy interior finish, wooden novelties, musical instruments, and a very large number of special uses. Its average price is \$18.75 per thousand feet.

Red maple is very inferior to the sugar maple and can only be used in a very limited number of ways as compared to the sugar maple. Special grade maple can always command a special price, especially if it has a



THE OLD STYLE OF FELLING TREES IN WOODLOTS—CHOPPING DOWN A FINE WHITE OAK.

twisted grain, making the famous bird's eye maple.

Oak is used mostly for agricultural implements, vehicle stock, car construction, furniture and interior finish. Its average price is \$25 per thousand feet, although good oak can generally find a ready market up to \$45 per thousand feet.

The white oak is more valuable than

the red oak, but both command the best price when cut into good logs for sawing "quarter sawn" lumber for furniture. Oak is also used to a large extent for ties, posts, etc. Very often trees are worked up into ties and posts which should be left to grow for lumber. Tops and smaller sizes can be cut into cordwood and brings a better price than ordinary cordwood.

The white pine is used for almost every purpose. The smaller sizes and inferior grades find their best uses for boxes, while the better grades and larger sizes are most valuable for furniture, interior finish, and for special uses, such as molds, match stock, etc. The average price is \$23.75 per thousand feet.

The red pine is used for much the same purposes as the white pine.

The pitch pine or yellow pine is used mostly for lumber, and is inferior even for that purpose. Near metallurgical works, such as smelters, a special use for this is found in the form of poles used in the reduction process. Pitch pine is often marketed in the smaller sizes for cordwood.

Spruce is used mostly for pulpwood, and larger sizes for ordinary building lumber, and, to a certain extent, for boxes. The average price is about \$19 per thousand feet.

Tulip Poplar or yellow Poplar is used mostly for interior finish, cigar boxes, and furniture. It is a high grade wood and generally can command a special price. The average price is about \$40 per thousand feet.

LUMBERING COSTS.

The owner, having estimated the amount of wood which he has standing and knowing the value of it in the markets, which he can reach conveniently, now wishes to know what it will cost to get his material from the tree to the market. When he knows that he is in a position to place a value on the standing timber.

In this discussion, we are taking account only of standing timber of merchantable size, which, it must not be forgotten, is much below the real value of the whole woodlot.

The costs of marketing the timber are:

First. Cutting down the trees and working them into logs, poles, ties, cordwood, etc.

Second. Skidding into convenient piles, or to a sawmill, if there be one on the tract.

Third. Hauling logs to a sawmill, if it is not on the tract; or hauling lumber and other products, such as ties, etc.,

to market, loading on cars, if necessary.

Fourth. Cost of sawing, piling, etc. While the costs of these various factors differ greatly according to circumstances, the following figures are given as fair average costs under general woodlot conditions and will serve as a guide in valuing timber.

COST OF HAULING.

Naturally the most variable cost is that of hauling, on account of the different distances to be hauled; because of difference in the nature of the country and condition of the roads; and through difference in weight between seasoned and greenwood, etc.

A large share of the lumber from woodlots is cut by small portable mills. These can be moved for from \$50 to \$100, and a stand of 75,000 to 100,000 board feet will warrant a "set up." Therefore, where the haul to any established mill is too long to be profitable, it may pay to have a portable mill come in and saw the logs. Often where there is not enough in one woodlot, two or three owners might combine to have a portable mill set up.

In hauling, an average load for a team along ordinary country roads is about 1,000 board feet of lumber; 32 first class ties, 38 second class ties, six 25-30 foot poles, four 30-35 foot poles, two 35-45 foot poles, or one cord of wood.

Ordinarily a team will average for a day's work, loading, hauling the load 6 to 9 miles, and then returning. The best time to haul is in winter, when sleighing is good.

The cost of a team and driver varies from \$4 to \$5.50 a day. Generally a team can be hired cheaper in winter than in summer, as in the former season farmers want work for their horses.

In the following figures, it will be assumed that the average cost of hauling is \$5 per thousand board feet—that is, that the average load above given, will be hauled; that only one trip per day can be made, and that the wages for the team and driver are \$5 per day. This is an average high price for hauling. Generally, it is considerably lower. It is used to be conservative

and rather as an illustration of figuring costs than to be fully representative.

The costs given are those up to loading on cars at the railroad or to delivery to local markets.

Average prices for the other items of cost are given. These can be modified in any given case.

COST OF PRODUCING LUMBER.

The cost of producing lumber may be estimated per thousand board feet as follows:

Cutting.....	\$1.50
Skidding.....	1.75
Sawing.....	3.50
Piling.....	1.00
Hauling.....	5.00

Or a total of \$12.75

COST OF PRODUCING TIES.

Ties are often hewn at a cost of about 10 cents per tie. Hewing is wasteful, especially in large-sized trees. Ties may be sawed on two or four surfaces.

Generally 33 first-class ties or 38 second-class ties will average about 1,000 board feet of lumber and the average cost will be 35 cents for first-class ties, and 29 3-10 cents for second class ties. Ties are 8 or 8 1/2 feet long. First-class ties are 7 inches thick, and not less than 7 inches or over 12 inches wide at any place on the face, and must be hewed or sawed on two faces. They are sometimes allowed to be sawed on four sides, and then to be 7" x 9".

COST OF PRODUCING POLES.

Poles are generally peeled and cut to come in one of two classes given in the specifications under products—the most common sizes are seven inches inside the bark at the top.

Poles cut in winter cost a little more to cut than in summer, but are preferred, because they are less likely to rot.

Frequently a cent a foot is charged per pole—that is, a 25-foot pole would cost 25 cents. Poles from 35 to 50 feet long are cut and peeled for 35 cents, while hauling cost may be estimated per load as 83 cents for 25 to 30 foot poles, \$1.25 for 35 foot poles; \$2.50 for

40 to 50 foot poles; \$5.00 for 60 foot poles, only one of the latter being hauled as a load.

COST OF PRODUCING CORDWOOD.

The average cost of cutting and stacking cordwood for burning is about one dollar per cord. Where oak and hickory predominate the cost will be higher.

An ordinary load is about 1 to 1 1/2 cords.

This would make cordwood cost \$6 per cord to cut and haul. It would be unprofitable where the haul was six miles or over, for only one cord could be drawn per day, at a cost of \$5 for team.

Where the only product available is cordwood, and the distance is too great to haul profitably, the wood may sometimes be burned into charcoal on the tract, and this profitably marketed.

Generally, at least twenty cords of wood should go into an ordinary kiln. Where several kilns are burned at once, the cost of burning is reduced considerably, as one man can watch them all as easily as he can one. It can be produced at a cost of 8 1-3 cents a bushel.

VALUE OF STANDING TIMBER.

Knowing market prices and costs of getting his material to the market, the owner is in a position to place a value on his standing timber. This value of standing timber is called its "Stumpage price." Where he does his own lumbering, the stumpage value might be considered the difference between the cost of marketing the product and the market price. This, however, is hardly a fair value. Each step should be considered separately, and a fair allowance should be made for each.

The lumbering being a manufacturing operation, it is only fair to allow about 20 to 25 per cent net profit on the work; and figure the real stumpage value as the market price, less the cost of lumbering and the profit of lumbering (20 per cent to 25 per cent of the cost). That is, stumpage value is the difference between market value and the sum of the cost of lumbering plus profit of lumbering. Then, if the

owner does his own lumbering, the stumpage value and profit in lumbering will both be his.

On the basis of costs given for marketing the product, stumpage values would be as follows:

<i>Lumber:</i>	Per M. bd. ft.
Average value of lumber "Long Run"	\$25.00
Cost of lumbering \$12.75 + 25% profit	15.94

Stumpage value. \$9.06

<i>Ties:</i>	First class	Second class
Average value.	\$0.56	\$0.50
Cost of lumbering and profit (25%)	0.44	0.36

Stumpage value. \$0.12 \$0.14

	25-30 ft.	35 ft.	40-50 ft.	60 ft.
<i>Poles:</i>	Poles	Poles	Poles	Poles
Average Value.	\$2.50	\$4.00	\$6.00	\$9.00
Cost of logging and profit (25%)	1.35	2.00	3.56	6.69

Stumpage value. . . \$1.15 \$2.00 \$2.44 \$5.31

Cordwood:

Average value \$4.00 for chestnut, and similar wood. \$5.00 for oak, \$6.00 for hickory.

At the rate of hauling, used in these figures, the value of the wood standing, as far as cordwood goes, would be nothing, as it would be a losing proposition to try and market it.

As noted, under such circumstances, it may pay to burn the wood into charcoal on the tract. This gives a lighter and more valuable product to haul.

Average value 34 bushels charcoal (from 1 cord of wood)	\$3.40
Cost of logging and profit (25%) on 34 bushels.	3.51

Stumpage value 1 cord of wood. \$0.10

(AMERICAN FORESTRY is indebted for the illustrations used in this article to the New York State Conservation Commission and the Rhode Island Department of Forestry.—*Editor.*)

Under the above theoretical conditions, it will be seen that selling cordwood, the owner would lose \$1 a cord, and converting it into charcoal would still be at a net loss of ten cents a cord, allowing 25 per cent profit. However, allowing 20 per cent on the operation, at 10 cents a bushel for charcoal, the owner could come out even, where he would lose money trying to sell as firewood. This sometimes is important in figuring on a pure improvement cutting, or in clearing land after fires, etc. As a general rule, the market for cordwood is closer at hand—mostly at home.

AVERAGE STUMPING VALUE FOR DIFFERENT PRODUCTS.

For convenient reference, taking in consideration ordinary conditions, in woodlots fairly well stocked and in from fair to good condition, the following stumpage value will give an idea of actual value, or of what should be a fair value for stumpage.

Cordwood for firewood, 50 cents to \$1 per cord.

Ties, 8 cents to 12 cents per tie.

Poles, \$1.25 for 30 ft. pole.

Lumber, \$6 to \$10 per thousand board feet.

Average stumpage value for woodlands of different sized average trees per acre in well-stocked stands will be about as follows:

Stands averaging	Value per acre.
4 inches diameter.	\$15.00
6 inches diameter.	25.00 to 30.00
8 inches diameter.	35.00 to 50.00
10 inches diameter.	40.00 to 65.00
12 inches diameter.	45.00 to 85.00

To be Continued.

Canada has established a forest products laboratory in connection with McGill University at Montreal, on the lines of the United States institution of the same sort at the University of Wisconsin.

Tree planting on national forests has to be confined to comparatively short intervals in spring and fall. In spring it starts when the snow melts and stops with the drying out of the ground; in the fall it comes between the fall rains and first snowfall.

New York leads all the other States in the Union in lumber consumption, with a total annual bill for timber of all kinds of over \$54,000,000.



AN OLD WOMAN GATHERING REFUSE FROM THE FOREST.
THIS EXEMPLIFIES IN A STRIKING WAY THE EXTENT TO WHICH THE GERMANS CAN PRACTICE
INTENSIVE UTILIZATION.

UTILIZATION AT GERMAN SAWMILLS

By NELSON C. BROWN

New York State College of Forestry at Syracuse

TO AN American interested in a more complete utilization of the raw products of our forests, a study of utilization at German sawmills is most interesting. It is said that in Germany, 94 per cent to 96 per cent of the whole tree on the average is utilized, even stumps being grubbed out and used for fuel and tar along with the faggots from the smallest branches, whereas it has been estimated by the U. S. Forest Service that we only use about 40 per cent of the average tree that is felled in the woods.

Of course, the obvious explanation of this discrepancy between American and German utilization is the difference in market conditions—wood is so scarce and consequently prices are so comparatively high in Germany that practically speaking, nothing goes to waste and no wood is too far distant from market to find an attractive price. But aside from this explanation, we must

give the Germans credit for studying their market more carefully and using machines and methods that we will come to use sooner or later. Although observations of their closer utilization may be largely suggestive in their present application to American conditions, yet, we are passing through very much the same economic environment that the older nations of Europe passed through two or three hundred years ago and we can take advantage of and profit by many of their close practices which our conditions will soon make possible.

It has often been an open question in this country as to whether the ultimate mill will be a large or a small one and which will secure the better and more complete utilization. In Germany, the small mill is the rule and there is no evidence that they will increase in size. They would correspond roughly to our mills having a capacity



A CHARACTERISTIC SAWMILL WHERE A GREAT VARIETY OF WOOD PRODUCTS ARE MADE AND NOTHING IS ALLOWED TO GO TO WASTE.
IN THE FOREGROUND, BOARDS FROM SELECT LOGS ARE PILED TOGETHER JUST AS THEY COME FROM THE SAW.

of from 30,000 to 60,000 board feet per day and the great majority would have the smaller capacity or less. For example, the largest mill in Bavaria and probably one of the largest in Germany, cuts about 16,000,000 feet a year, which means a daily capacity of about 64,000 board feet when running two hundred and fifty days a year.

Practically every house and building in Germany is largely constructed of stone, brick, or concrete, so that construction and building timbers are not much in demand. The majority of the product therefore goes into interior trim, sash and door stock, flooring, box boards, furniture, cooperage, fencing, railway sleepers, and a great variety of minor lines of utilization. For the majority of these uses, therefore, they demand well sawn stock. Consequently the gang saw is the rule, with a very narrow kerf and the minimum amount of wood going into sawdust.

Wood is very expensive and labor cheap in Germany, so that German machines are built to save lumber and power, whereas American machines are built to save labor. Our machines are

built to turn out enormous quantities of product at our sawmills; on the other hand, their machines turn out quality of product. German machines are frequently constructed and fitted to serve a variety of purposes whereas American machinery is intended to turn out one product and to do that quickly. German machinery in turn ordinarily lasts for a long time, whereas ours is not expected to last more than fifteen to twenty years or so.

It is gratifying, however, to see the amount of American machinery in use in Europe. At the above mentioned Bavarian mill, several of the pieces were of American make. In fact, the only band sawmill in the whole Black Forest region and one of the very few in Germany was fitted with machinery made by an American manufacturer. Another interesting fact in connection with these small sawmills is the great variety of products that are usually turned out. Many of these are by-products of the main output and would frequently be sent to the "hog" or burner in this country.

Contrasted to our American condi-



AN ELECTRIC CUT-OFF SAW USED TO CUT LONG LOGS INTO THE DESIRED LENGTHS.
IT CAN BE MOVED BY OVERHEAD TROLLEY TO ANY PART OF THE ROLLWAY AND SAVES
A LARGE AMOUNT OF UNNECESSARY WASTE IN TRIMMING.

tions, small logs are the rule. This is explained by the fact that under any system of scientific forest management, it does not pay to wait until trees become of large size before they should be cut. The "financial rotation," as it is called, permits of the growth of trees just large enough to be utilized for saw logs and not left long enough in the woods for the compound interest charges to nullify the dividends. This means therefore rather knotty and low grade lumber.

Long timbers or tree lengths are also the rule. On many operations 23 feet (7 meters) is the minimum log length. The advantages explained in connection with this procedure are that the logging and transportation to the mill are more economical, the long logs can be better sawed to the desired length whatever the demands of the market, at the mill, and there is no loss in trimming. Loggers in this country commonly allow from three to six inches for abrasion in transportation and trim at the mill. In many of the German mills, logs are cut to the even desired length and there is no trimming done at all. Long lengths are al-

barked before shipment. It is said that bark constitutes an average of 10 per cent of the total material in a log. In the case of Norway spruce, beech, and oak, the bark is used for tanning purposes. The bark of other trees is used for fuel.

Another important phase of utilization at German sawmills is the universal practice of sawing closer than is the custom in this country. That is, only an eighth or a sixteenth of an inch is allowed for dressing and stock intended for a variety of uses is never allowed to be sawed one inch in thickness, when three-quarters or five-eighths will suffice. Of course different standards of measurement are used in Germany (metric system) but this is offered as exemplary of the manner in which they study their market and then saw accordingly.

As mentioned before, there are hardly ever any trimmings which in this country go to the "hog" or are sent to the burner. Edgings are used for handles of all kinds, chair rounds, novelty and toy stock, etc., and are seldom used for fuel. The wooden toy industry is very important in Germany



LOGS ARE USUALLY SENT INTO THE MILL ON SMALL TRUCKS RATHER THAN A JACK LADDER.

and toys are exported to America as well as to every European country. The center of this industry is in Nuremberg in northern Bavaria. Slabs are utilized largely for boxboards, veneer cores, short stock, fuel, novelties, etc. Sawdust is sold for fuel and is utilized for making paper and wood alcohol and for general packing purposes. In covering practically every producing region of Germany, the writer failed to see a refuse burner and it is doubtful if there is one in the whole country. Practically all of their ties are sawed, which saves the enormous waste prevalent with our hewn ties. The German railway specifications are also very economical in that in cross section ties need not be rectangular as is the case with American ties. The upper side can be as narrow as five or six inches, as long as the base or lower face is at least ten inches in width. By this means, many logs are made to yield two ties instead of one as with our railroads.

A very interesting feature of their sawmills is that hydro-electric or even steam power supplied with coal is utilized in many cases instead of using sawdust and refuse for fuel. Scarcely a single horse-power in the form of

falling water in the mountains is allowed to go to waste with the consequent result that a great economy is introduced. It is said that the first sawmill in Germany was run by direct water power as early as 1322.

In grading, rules formulated and adopted by lumber associations similar to those in this country are prevalent. They are based on dimensions and defects in the same manner as with our own lumber associations. All lumber cut from certain butt logs is piled together for special uses such as matched veneers, furniture stock, and fancy panel stock. In almost every lumber yard it is a common sight to see these boards from the select logs piled one on top of the other just as they occurred in the log. Much better prices are secured in this way for the best grade of logs. Most of the oak from the famous Spessart region is piled in this way and for fancy veneers and cabinet work, especially fine large trees are said to bring from \$500 to \$1,000 on the stump.

Wood is sold by the cubic unit rather than by the board foot and it is probable that in the future we will adopt the same method. One is somewhat sur-



THESE LOGS ARE DECKED BY ELECTRIC MACHINERY.
THIS METHOD IS USED INSTEAD OF THE AMERICAN LOG STORAGE PONDS TO HOLD THE LOGS
BEFORE BEING SENT THROUGH THE MILL.



A LOGGING SCENE IN THE SPRUCE REGION OF SAXONY.
ALL OF THE AVAILABLE MATERIAL IS UTILIZED IN THE FORM OF LOGS, PULPWOOD, BARK,
FUEL WOOD OR FAGGOTS.



THE MUNICIPAL LANDING ON THE ISAR RIVER NEAR MUNICH, WHERE THE RAFTS ARE
BROKEN UP AND THE LOGS SENT THROUGH THE MILL.
DRIVING IS STILL A COMMON PRACTICE IN THE MOUNTAINOUS REGIONS OF GERMANY.

prised at the amount of lumber seasoned wholly in the open or under sheds. Although considerable is dry kilned not as much is put through this process as one would naturally expect.

Since Germany's forests produce only four principal species namely Scotch pine, beech, Norway spruce, and silver fir with only a little oak, ash, maple, hornbeam, etc., their problem of utilization is much simplified. Many foreign woods, as a result, are introduced to

supply the demand and American timbers are highly prized.

At several of the mills visited, many intensive lines of utilization were developed. For instance, at one mill, besides the usual lumber and box board product, there were special machines for turning out broom handles, wooden shoes, implement stock, cooperage, furniture stock, ties and excelsior, and in addition there was a Boucherie timber treating plant to prolong the life of telephone and telegraph poles.

In the United States as a whole four-fifths of the standing timber is privately owned, and one-fifth is owned by various States and the Federal Government. New York owns one fifth of the forest land of the State and one fourth of the standing timber. Owing to a clause in the Constitution this timber cannot be cut even though it is dying or dead and a menace to healthy timber about it. The State should allow careful cutting of mature timber in the Adirondacks.

New York manufactures more pulp paper than any other State, consuming over 1,000,000 cords of wood per annum. Maine, its nearest competitor, is surpassed by over 100,000 cords.

With over 6,000,000,000 bd. ft. of timber growing on the forest land owned by the people of the State of New York, over \$20,000,000 is sent out of the State each year for forest products. Proper use of the mature forests of the State and reforestation of land now idle would keep much of this vast sum in New York.

FORESTRY ADDRESS TO STUDENTS

Extracts from an Address on Forestry Delivered by invitation before the Faculty and Student Body of Oberlin College, Ohio, January 16, 1914, by Henry Sturgis Drinker, President of Lehigh University and President of the American Forestry Association.

In the opening words of this Address, Dr. Drinker summarized, as he did in his address at Tome Institute published in the October number of AMERICAN FORESTRY, the rise and history of the Forestry and Conservation movement in this country, noting the early work in conservation of the American Institute of Mining Engineers, so long ago as 1871, in the appointment of its Committee "to consider and report on the waste in Coal Mining"—the constant warnings that have come from the engineering professions—the Conference of Governors at Washington, called by President Roosevelt and largely the result of the insistent public preachings on Conservation and Forestry of Gifford Pinchot—the calling in 1909 of the first Conservation Congress at Seattle and finally the splendid forestry record of the last or Fifth Conservation Congress held last autumn.

In regard to the meetings of this Congress, Dr. Drinker said: "The Congress has addressed itself in its several meetings to many important phases of Conservation. Forestry was given much attention in the first two sessions. Then the one at Kansas City in 1911 was largely devoted, as President Wallace expressed it, to the Conservation of the fertility of the soil and the life of the people who live in the open country. The Congress at Indianapolis in 1912 was devoted to the study of the Conservation of vital resources and the health of the people, and finally in this last Congress of 1913 Forestry again came to the front, and the principal subjects of discussion were Forestry and our water power resources—two full sessions of the Congress and a large number of sectional meetings being devoted wholly to forestry; and at these sectional meetings a set of ten exhaustive reports, prepared

by Committees arranged for and financed wholly by the American Forestry Association, were presented on the following subjects:

- Secondary Forestry Instruction in the United States.
- Publicity—Public Education in Forestry.
- The Framing, Passing, and Enforcing of a State Forest Law.
- Forest Tax Legislation.
- Fire Prevention by States, by the Federal Government, and by Private Interests.
- The Conditions under which Commercial Planting is Desirable.
- Lumbering.
- The Closer Utilization of Timber.
- The Relation of Forests and Water.
- Federal Forest Policy.

"With the above reports by special sub-committees, the General Forestry Committee also submitted a general report giving a synopsis of these sub-committee reports, and also published an exhaustive and able report on 'State Forest Organization with special reference to Fire Protection' by Mr. J. Girvin Peters, Chief of State Cooperation in the U. S. Forest Service. These reports are without doubt the best full summary ever made of the whole forestry situation in our country. The various committees were composed of picked men, experts on the subjects treated, and the reports are obtainable by application to Mr. P. S. Ridsdale, Executive Secretary of the American Forestry Association, 1410 H Street, N. W., Washington, D. C."

Dr. Drinker in his address then touched on the early history of the American Forestry Association and of the Pennsylvania Forestry Association, paying tribute to the services to the cause by Dr. J. T. Rothrock and Mr. John Birkinbine as Secretary and as President of the latter Association, founded so long ago as 1886, and then said:

"These initial movements have now so spread that the Forestry State Organizations and the various Forestry Associations in the United States cover:

- 33 States having Forestry Departments;
- 17 States having Conservation Commissions and Similar Organizations;
- 2 National Conservation Organizations;
- 2 National Forestry Organizations;
- 23 National, State, and Local Forestry and Conservation Organizations;
- 42 Conservation, Timber Protective, and Allied Associations;

And there are now in operation:

- 23 schools with courses leading to a Degree in Forestry;
- 11 schools with courses covering one or more years in Forestry;
- 42 schools with short courses in Forestry.

"This is the machinery now in existence, and rapidly enlarging, for the study and care of our forest interests. Now what in fact do those interests comprise, succinctly stated—

"The forests of the United States at this date (1914) cover 550,000,000 acres, National, State and private, divided as follows:

- 295,000,000 acres corporations and individuals;
- 100,000,000 acres farm woodlots;
- 140,000,000 acres national forests;
- 10,000,000 acres Indian reservations;
- 3,246,000 acres state forests;
- 2,000,000 acres National parks.

"The annual product of the forests amounts to about 20 billion cubic feet, or about 140 billion board feet.

"The lumber industry ranks first in number of wage earners and third in value of products in our country. According to the Census of 1909, the latest actual figures available, the number of wage earners is 734,989. The value of forest products in that year is given as \$1,156,129,000. The forest Service approximates the present value as \$1,250,000,000.

"The money paid out for salaries and wages was in 1909, \$366,167,000, of which \$47,428,000 was for salaries and \$318,739,000 for wages.

"Surely interests so large are worth caring for. What are we doing to preserve and foster them? It was first said by, I think, Gifford Pinchot, that the two great enemies of forestry, of our woodland growth, are Forest Fires and Unwise Taxation. The country has measurably been awakened to the fire danger. The United States Forest Service notably has done and is doing

immensely good and valuable work in this direction and not less than 29 States make annual appropriations for forestry (including fire protection)—ranging in some few States from small amounts up to \$164,500 in New York, and \$328,000 in Pennsylvania, last year, the total in all the states so appropriating being \$1,340,300. The various Forestry and Fire Protective Associations are unceasingly active in fire protection work, led by the example of the Great Western Forestry and Conservation Association which embraces the States of Washington, Idaho, Montana, California, and Oregon, and of which E. T. Allen, of Portland, is the well-known Forester. This Association set the example of printing and distributing among the school children of those States, circulars containing succinct expressive lessons on the fire danger, luridly illustrated, and this example was followed in Pennsylvania in 1912 by the issuance and distribution among the 1,000,000 or more public school and parochial school children of the State, of a Fire Circular prepared and published jointly by the Pennsylvania Forestry Association, the Pennsylvania Conservation Association, the Philadelphia Commercial Museum, and Lehigh University. This circular has been copied and issued in Massachusetts by the Massachusetts Forestry Association and distributed among the 450,000 Public School Children of that State, and also in North Carolina by the North Carolina Forestry Association, and such issue is contemplated in other States, the importance of impressing on school children throughout the country the danger and the useless and great loss resulting from woodland fires being widely felt. A burned building can be comparatively soon rebuilt, but it requires a great many years to grow a forest. When fire runs through the woods practically all the young trees are killed and most of the older ones greatly injured or destroyed, and so also are the live seeds and nuts in and on the ground, all the laurel and berry plants, and the humus or mould soil which holds the stored water from the rainfall, and from which our springs,

creeks, and rivers are kept flowing during the summer and in times of drought.

"So much for Forest Fires—now as to Unwise Taxation:

"Remember that a farmer growing grain may annually harvest and sell his crop, and have wherewith to pay his taxes, but the timber grower raises a crop that does not mature for thirty or forty or fifty years or more, and the taxes should be adjusted so as to bear on the yield when it comes with the cutting of the timber, and not be assessed and made payable annually, or the owner will cut and sell his timber to avoid the annual tax on a crop giving no annual return. Legislation of this nature formulated by Committees of the Pennsylvania Forestry and Conservation Associations was enacted in Pennsylvania in 1913 to encourage reforestation by private owners, and similar action has been taken in New York, Louisiana, and Connecticut, and is in contemplation in other States: Massachusetts and Ohio have recently adopted Constitutional amendments permitting such legislation, and its importance is becoming generally appreciated.

"Whether timber-growing will be undertaken on any large scale by private owners, in this country, even under the most favorable conditions of protection, taxation, and location, is problematical. The work is apparently one mainly for the Federal and State Governments, though much can be done by the private citizen who remembers the Laird's injunction in the 'Heart of Midlothian,' when on his death-bed he enjoined tree-planting on his son, saying,—'Jock, when ye hae naething else to do, ye may be aye sticking in a tree; it will be growing, Jock, when ye're sleeping.' Walter Scott, in a footnote, says of this, 'The Author has been flattered by the assurance that this naive mode of recommending arboriculture (which was actually delivered in these very words by a Highland laird while on his death-bed, to his son), had so much weight with a Scottish earl as to lead to his planting a large tract of country.'

"The National Government under

the provisions of Acts of Congress enacted in 1891 and 1896 has set aside large areas for National Forest Reserves in some twenty States, about 140,000,000 acres net area (not counting alienated lands located within the boundaries of the National Reserves); in addition to which there are nearly 27,000,000 acres in Alaska, and about 66,000 acres in Porto Rico, 167,066,000 acres of Government Reserves; if we reckon with this the land located within the boundaries of the National Forests, approximately 21,000,000 acres which have been alienated, we have about 188,000,000 acres in all. These reserves are admirably managed by the United States Forest Service organized in the Department of Agriculture under the charge of Henry S. Graves, United States Forester.

"Fourteen states have set aside areas ranging from 1,950 acres in one state, to 231,350 in Michigan, 400,000 in Wisconsin, 983,529 in Pennsylvania, and 1,644,088 in New York, as State Forests, the total area so set aside in all States being 3,246,832 acres; and these States in their Forestry or Conservation Bureaus are studying and promoting the best utilization of these lands for the public needs. This is supplemented by the work of the Forestry schools and Forestry Associations of the land. A striking instance of this is shown in the study of harvest-bearing trees, made during the past summer by Professor J. Russell Smith of the Wharton School of Finance and Commerce of the University of Pennsylvania.

"If we turn to the Bible for citations in forestry, we find a rather utilitarian view of forestry running through the citations—the interest seemed to center in the preservation only of fruit or nut-bearing trees; for instance in Deuteronomy, Chapter 20, verses 19-20, it is written, (When thou shalt besiege a city a long time, in making war against it to take it, thou shalt not destroy the trees thereof by wielding an axe against them; for thou mayest eat of them, and thou shalt not cut them down, for is the tree of the field man that it should be besieged of thee? Only the trees which thou knowest that they be not trees

for meat, thou shalt destroy and cut them down.) This Scriptural view seems to have been impressed on the Mediterranean littoral lands. Professor Smith's attention was drawn some years ago to the fact that much more attention was being given to the growth in the Mediterranean countries than here of harvest yielding trees, and he went abroad during the past year and made a very valuable study of this subject. As he well says:

"The immediately important reason for the forestry movement is to prevent an impending wood famine, but the ultimately important call for tree planting is to prevent the wasting of hilly lands and their destruction through erosion. This loss is irreparable. The farmer is accordingly being urged to reforest much of his steep land, which should never have been cleared. The argument in favor of this farm planting can be greatly strengthened if the farmer is urged to plant trees which will yield annual harvests rather than the one final harvest of wood which comes at the end of many years and makes a relatively meagre average annual return.'

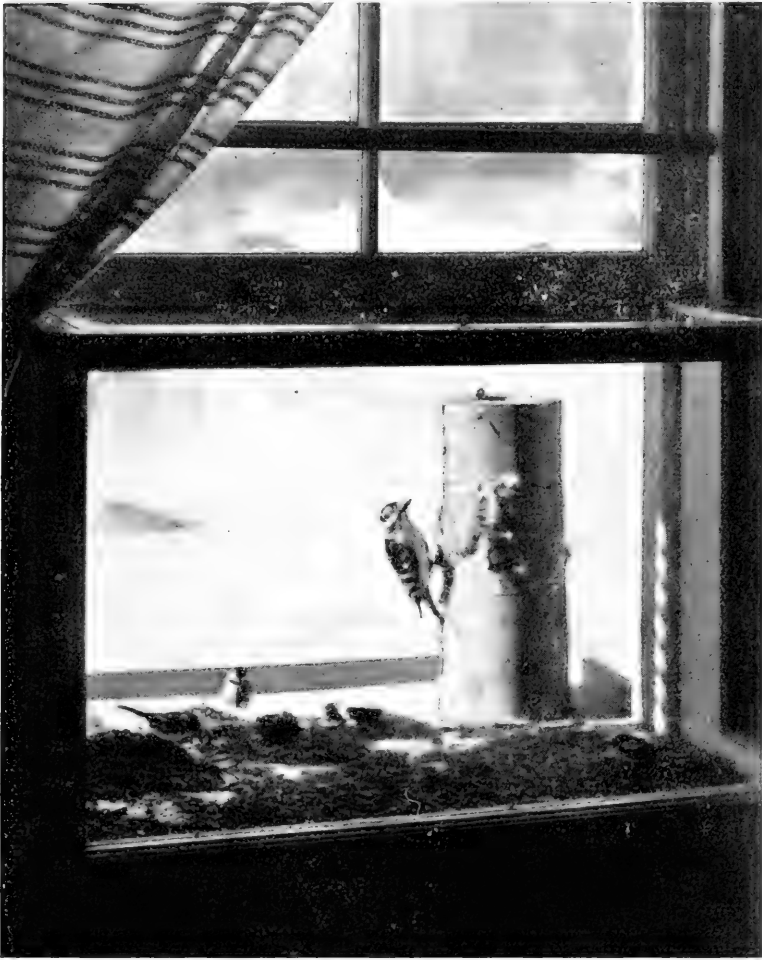
"Professor Smith tells us of grafted Chestnut forests on granitic mountain slopes in Corsica which cover large areas as steep as the slopes of the Appalachians, and that this one crop with the attending pasturage beneath the trees serves to keep a fairly dense population in a prosperous condition—that a large proportion of the total pork product of the Iberian Peninsula is due to acorn food. He suggests that, 'The honey locust has a sugary food around a nitrogenous bean with a total analysis much like that of the widely grown carob or St. John's bread of the Mediterranean countries. The carob bean sells for 1c a pound and is a regular crop in extensive territories. While the carob will not grow in America, its age-long success (it fed

the prodigal son, the scriptural swine, and St. John, the Baptist), suggests that we can use the allied bean-producing trees, honey locust and mesquite, for crop development in America. This is particularly the case because the mesquite has already become an important crop in Hawaii, where it yields from four to ten tons per acre a year, the bean meal selling for \$25 a ton as a substitute for bran. Both of these American beans are greedily devoured by animals wherever they can be found.'

"Professor Smith urges that the example of the Corsica Chestnut forest, the Iberian cork and acorns, the carob, the mulberry and persimmon hog pastures, the Hawaiian mesquite, and other promising nut and fruit bearing trees, seems to indicate the easy possibility of the development of a fruitful forestry rather than a wood forestry, where the conditions are proper, so that we may have a plowless agriculture for steep lands, and he emphasizes the great importance of the development of tree grown forage crops. These suggestions are from letters from Professor Smith to me personally, and are only indications of the fuller information and conclusions which we may hope he will give us soon in published form of his original investigations in this interesting phase of the forestry question."

Dr. Drinker closed his Oberlin address with the warning given in his Tome address, that the public in studying forestry and conservation should not be led aside by sentiment or wrong doctrine, that the main lesson of the conservation of our natural resources is that they shall not be locked up for the needs of future generations to the exclusion of the needs of today and that we should remember, as epitomized by Dr. C. W. Hayes, that conservation is "Utilization with a maximum efficiency and a minimum waste."

Roadside signs, each containing a single catchy sentence in large type, are proving effective in warning against fires on western forests. They give the essentials and tell the importance of protection against forest fires.



A WINDOW BOX IN MERIDAN SHOWING BIRDS FEEDING.

Photo by Ernest Harold Baynes.

STATE FORESTS AS BIRD SANCTUARIES*

By WILLIAM P. WHARTON

IN a recent address by the well-known naturalist, Mr. Ernest Harold Baynes, on Bird Protection, the speaker began his remarks by asking three questions: (1) Do birds need protection by man? (2) Is bird protection by man justified on purely economic grounds? (3) If the answers to these two questions are affirmative, what methods can man employ to the best advantage to protect and increase birds? It requires but a few familiar illustrations from the history of bird

life in this country to prove conclusively that nearly all species of birds must have some sort of protection from man if they are to survive. The passenger pigeon, the great auk, the Labrador duck, the Eskimo curlew are extinct chiefly as a result of unrestrained persecution by man, and the heath hen, upland plover, egret and others have been reduced to the danger point by the same cause. Many other species are rapidly diminishing as a direct or indirect result of man's activities. It is



A YOUNG CHICKADEE AT HOME, NEAR MERIDAN, N. H.

Photo by Ernest Harold Baynes.

needless to inquire further into a question the answer to which is so patent.

The second question—that relating to the economic value of birds—is a more complex one, and the answer to it is not so universal in its application. The investigations of the U. S. Biological Survey, however, indicate strongly that birds as a whole are of the greatest value to the general agricultural interests of the country. An insignificant minority of birds—as for instance the sharp shinned and Cooper's hawks, which prey largely upon useful birds, and certain birds which do extensive damage to farm crops—has been condemned, but the great majority of species have been found, through care-

ful investigation of the contents of their stomachs, to be decidedly beneficial. Although the relation of birds to forests has not been studied quite so carefully in this country as their relation to purely agricultural crops, yet considerable data have been compiled on this subject, and these indicate that birds in the forests are fully as useful as, and perhaps less harmful than, they are in the cultivated fields.

Among the conspicuously useful forest birds in Massachusetts is the familiar chickadee, considerably over one half of whose food consists of moths, caterpillars and other harmful insects and their eggs, including both tent caterpillars, canker worms, codling moths,

gipsy and browntail moths, bark beetles, plant lice, and probably the white pine weevil, which latter does so much damage to young white pine stands in many parts of the State. The woodpeckers also are great forest protectors, 76 per cent of their food consisting of animal matter, largely boring beetles. It is hoped that the spread of the leopard moth, which has destroyed so many of

the fine elms in Boston and its vicinity, will be checked in the rural districts by the woodpeckers, which are known to feed on this pest. These birds and some others are working for us in Massachusetts during the entire year. Other forest birds, as for instance the many species of wood warblers, the kinglets, cuckoos, certain flycatchers, thrushes, etc., are in the State only a part of the



ONE SIMPLE TYPE OF FEEDING DEVICE, WHICH COULD BE USED TO GOOD ADVANTAGE IN THE STATE FORESTS.

IT IS A "WEATHERCOCK" FOOD HOUSE WHICH SWINGS WITH THE WIND.

Photo by Ernest Harold Baynes.

year, but during that period they are of vast importance as checks upon the increase of insects injurious to forest trees. Finally certain birds of prey, such as the sparrow, marsh, and red shouldered hawks, and the little screech owl, should not be forgotten; for, by preying on the mice which girdle young trees, and on other rodents, they perform a valuable service to the forester. It is hardly necessary to go further into a subject regarding which there is prac-

measures should be taken to protect and increase such birds. The city of Frankfurt am Main expends about \$400 annually in such work. An area of a hectare, adjacent to one of the forest nurseries, has been especially set aside for bird protective work in an intensive way. Of the 100 specially constructed nesting boxes on this area, 90 per cent are said to be occupied by birds each year. Feeding stations and baths are also maintained, one of the latter being



A NEARER VIEW OF A NEST PLATFORM MADE BY PRUNING OF A THORN BUSH.

Owing to the rather dense foliage the structure of the "whorl" cannot be clearly seen. Estate of Baron Von Berlepsch.



ONE OF THE NEST PLATFORMS FORMED BY THE PRUNING OF A THORN BUSH.

The shoots are cut back each year, in order that leaves may surround and protect the nest. Estate of Baron Von Berlepsch.

tically no difference of opinion among investigators. We may therefore assume that bird protection in the forests is justified and desirable on purely economic grounds.

It is interesting to note that German foresters reached this conclusion as regards their forest birds some time ago, and they are now showing us how to answer the third question, as to what

so constructed that the water is prevented from freezing in cold weather by the heat of kerosene lamps beneath it, while blocks of wood and perches are set in the water at varying depths to accommodate different species of birds. Darmstadt has placed some 6,000 nesting boxes in her woods, of which between 80 per cent and 90 per cent are



FLICKER ABOUT TO FEED YOUNG AT ENTRANCE HOLE OF A BERLEPSCH NEST BOX
NEAR MERIDEN, N. H.

Photo by Ernest Harold Baynes.

occupied yearly, has established thirty feeding, drinking and bathing stations for birds, and planted two areas with special shrubs adapted to pruning for bird-nesting purposes. In the Heidelberg forests, besides nesting boxes, single shrubs or small groups of species similar to those at Darmstadt are planted in young plantations of forest trees, and so pruned as to form platforms for the nests of birds that nest naturally in shrubs and trees, after the method devised and practiced with

such wonderful success by Baron Hans Von Berlepsch on his estate at Seebach, Germany. Here too are about fifty feeding stations. At Baden Baden, also, nesting boxes have been hung in the forest, and plantations established; but here, owing probably to the presence of old trees having natural cavities, probably not over one third of the boxes are occupied. To my questions at these places the foresters' answers were always substantially the same: "We consider birds of great importance in



THE "AUDUBON FOOD HOUSE." COPIED FROM A FOOD HOUSE ORIGINATED BY BARON VON BERLEPSCH.

THIS ONE STANDS IN MERIDEN, N. H.

Photo by Ernest Harold Baynes.

the protection of the forest, and we believe that there is less damage from injurious insects at present than before these bird protective measures were practiced."

Probably the most convincing instance of the value of birds in controlling insect outbreaks in the forest occurred in 1905, in the private forest of Baron Hans Von Berlepsch, who has been mentioned as the originator of the special measures of protection which are being copied in the forests of the valley of the Rhine. Parenthetically it should be stated here that the Baron's system consists in supplying to birds their three chief needs: (1) Favorable nesting sites, of which many of the original natural ones are removed by the in-

tensive practice of agriculture and forestry; (2) Food and water in larger quantities than would naturally be present, especially in winter; (3) Protection from their natural enemies through the killing off of polecats, weasels, stray cats, English sparrows, certain hawks and jays, and some other predatory animals. In his forest the Baron placed several thousand nesting boxes, carefully made in imitation of the nesting holes excavated by the woodpeckers, which latter are commonly used by many of the most useful forest birds. These were placed from 30 to 40 paces apart throughout the broadleaf stands, and at various openings in the dense coniferous stands. The birds, especially the woodpeckers and the tits



THE CASTLE FROM THE PARK, ESTATE OF BARON VON BERLEPSCH.
THE TREES AND SHRUBS ON EITHER SIDE OF THE VISTA ARE FILLED WITH BIRDS NESTS.



THE ANCESTRAL CASTLE FROM THE PARK, ESTATE OF BARON VON BERLEPSCH. CAVITIES MADE IN THE WALLS OF
ONE OR MORE PAIR OF MOORHENS NEST ABOUT THE POND AND MANY OTHER BIRDS IN THE TREES AND SHRUBS SURROUNDING. THE CASTLE ARE OCCUPIED BY BIRDS.



A GENERAL VIEW OF ONE OF THE "SHELTERWOOD" BIRD NESTING PLANTATIONS OF SHRUBBERY ON THE BORDER OF A WOOD, ESTATE OF BARON VON BERLEPSCH.

—which latter are similar to our chickadee—soon occupied approximately 90 per cent of these boxes. In 1905 occurred a great outbreak of the destructive moth called *Tortrix Viridana*. The woods surrounding those of Baron Von Berlepsch were stripped virtually clean, but the Baron's trees, protected by the birds, and by no other known agency, retained their foliage, and stood out amid the surrounding desolation like a green oasis in a desert.

The application of German methods to Massachusetts conditions will not, of course, be all plain sailing, but it may be reasonably assured that the general principles are as applicable here as there, and that the difficulties will come in adapting the German practices to American environment. Probably everyone will agree that the useful non-game birds should receive in our State forests the same complete protection from molestation by man which they now enjoy under the law throughout Massachusetts. The next step, then, should be to protect them so far as practicable from their other enemies, and this object could be accomplished to a large degree by requiring wardens or rangers to kill off certain predatory

creatures. Feeding stations and bird baths, established at favorable points in the forest, would undoubtedly attract and hold many birds which might otherwise pass on. The problem of nesting sites is more difficult. Owing in part to the comparative novelty of the artificial nesting box, and in part to the presence of a good many natural nesting cavities in our forests, birds thus far have not taken readily to the former where they have been placed in the woods. Boxes so situated are usually occupied by squirrel or mice, or remain empty, though I am told that flickers and screech owls have been known to nest in them. On the edges of clearings and in old orchards and fields these boxes are now used to a considerable extent, and this is a hopeful sign of what may be expected later in the forests. For as the improvement of the forest proceeds, and dead and decayed trees are eliminated—thus approximating German conditions—the birds will in all probability take more and more to the boxes, and a decrease in their numbers will thus be prevented. Then, becoming habituated to these artificial conditions, and increasing as a result of the protection and encouragement af-



A ROW OF POPLARS WHOSE BRANCHES ARE CUT BACK TO THE TRUNKS EVERY FIVE OR SIX YEARS TO FORM NESTING SITES. ONE OR TWO NEWTS OF THE YEAR WERE TO BE FOUND IN PRACTICALLY EVERY TREE. ESTATE OF BARON VON BERLEPSCH.

fording them in other ways, there is good reason to hope that ultimately they can be colonized in much larger numbers than are now present under natural conditions—in numbers large enough to control, as they do in Germany, many of the injurious forest insects. For birds nesting in the branches of trees and shrubs, the pruning of certain of these after the German plan, and the planting of hedges and undergrowth in certain places, will, if German results are any criterion, eventually produce a large increase in nesting birds.

The effectiveness of the pruning of underplanted shrubbery on the estate of Baron Von Berlepsch is little short of marvelous. In a double row hedge of thorn (*crataegus oxycantha*) on the edge of a wood, the writer counted thirty-one nests of the year in a distance probably not much exceeding 300 feet, and would probably have found a proportionate number in the larger part still remaining, had the lateness of the hour not prevented. While awaiting the results of his pruning, Baron Von Berlepsch has found that the tying together of the branches of bushes is effective as a temporary expedient. These methods, so far as known to the

writer, have not as yet been given a trial in this country.

One phase of this problem has thus far been unmentioned, that relating to the conservation of game birds in State forests. A detailed discussion of this



A FAMILY OF YOUNG BLUEBIRDS ON TOP OF THE NEST BOX IN WHICH THEY WERE HATCHED NEAR MERIDEN, N. H.

Photo by Ernest Harold Baynes.

subject would require much more time and space than can be allotted to an article of this nature. In a general way most people will agree that such a splendid bird as our New England ruffed grouse, or partridge, should by some means be assured perpetuation in goodly numbers in our forests. Without doubt this and other game birds would profit largely by the destruction of predatory animals and other measures for the protection of the other birds. The question then naturally arises, should shooting of game birds be allowed on these forests? It is one perhaps which we are not yet quite ready to decide.

In her large Forest Preserve, New York allows the taking of game under practically the same regulations as elsewhere in the State. Pennsylvania has marked off inviolable sanctuaries in the middle of many of her forests, and the overflow of game from these protected areas is said to be large. At a time when the posting of both public and private lands against shooting by the public is proceeding at a rapid rate, and many sportsmen are complaining bitterly because of that fact, it behooves us to

consider the future of the recreation of hunting for the average man. One means of assuring him the opportunity for healthful sport in the future is to make State forests public game preserves. Under game preserving methods, State forest lands could probably be made to produce a large head of game annually, and a certain amount of carefully restricted shooting in them would not decrease the breeding stock from year to year, and would be in no way inconsistent with the complete protection and increase of the non-game birds. Even on the remarkable sanctuary of Baron Von Berlepsch, a certain amount of game shooting is done, without resulting in any progressive decrease in the amount of game. Under any such arrangement, however, it is of the utmost importance that the management of the animal life (as well as the vegetable) be kept in competent hands and out of politics, to the end that the killing of game be regulated in such a way as to insure a plentiful supply at all times, and that the abundance of bird life be the primary consideration.

*From an address at the annual meeting of the Massachusetts Forestry Association.

Receipts from the use of national forest resources were greatest in Arizona last year.

The State of New York has just published a comprehensive report of its wood-using industries.

Of the three Pacific coast states, Oregon and Washington far outstrip California in the work done by private owners for forest protection.

Manufacturers of greenhouses and makers of boxes are getting in touch so that the latter may use for box cleats the cypress waste from the greenhouses.

The development of quicksilver mines promises to make large demands for cordwood and construction timbers on the Tonto national forest, Arizona.

Dr. C. D. Marsh, of the Federal Bureau of Plant Industry, is delivering a series of illustrated lectures to stockmen in the west on the subject of plants poisonous to stock.

The Biltmore Forest School, established in 1898 and therefore the oldest forest school in America, has been discontinued. Dr. C. A. Schenck, its director, has returned to his home in Germany.

Lodgepole pine seed sown broadcast on the snow in southern Idaho last spring germinated when the snow melted, and as many as 60 little trees were counted to the square foot. The summer was so dry, however, that most of the plants died, except where sheltered by brush or logs.

FOREST NOTES

Over 60 acres of land on the College Campus at the Pennsylvania State College have been set aside permanently by the Trustees of the College for the gradual development of a forest arboretum. The tract reserved for this purpose is within two minutes walk of the Forestry Building and lies next to the woodlot of 18 acres which now serves as the "woods laboratory" of the forest school. It is planned to gather together in this arboretum the shrubs and trees that are indigenous to the State of Pennsylvania. No such collection now exists and from a botanical standpoint such a collection will be of great value to botanists everywhere. In addition all trees that can be grown in the climate of Pennsylvania, both native and foreign, will be planted. Such trees as may be of value for making forest plantations will be grown in clumps of a quarter acre each, so that they will grow under forest conditions and develop the form of bole and crown characteristic of forest-grown trees. Each of the trees as well as all others will also be grown as individuals so as to develop the natural beauty and form of these trees when grown in the open, which makes them of value for decorative purposes. Many experiments will be carried on in connection with the arboretum and data taken as to the growth and development of the trees, their value for forest and decorative purposes and their suitability to the climate of Pennsylvania. Planned as the arboretum is on such a wide scale, with the possibility of the tract being greatly extended, should the demand ever come, it is believed that the forest arboretum at State College will in time take its place among the famous tree gardens of the country.

A Division of Forestry has been established in the College of Agriculture at the University of California. Professor Walter Mulford, at present head of the Department of Forestry at Cornell University, has been appointed to take charge of the work at Berkeley.

Mr. M. B. Pratt has been appointed assistant professor in the new Division. At the time of his appointment to the faculty of the University, Mr. Pratt was Deputy Supervisor of the Tahoe National Forest in California. Mr. Pratt is already in Berkeley, and is giving during the present college term a non-professional lecture course on general forestry.

After a careful canvass of 87 of a list of 194 lumber mills in Washington, which Representative Humphreys, of that State, had charged were closed down on account of the new tariff, Secretary of Commerce Redfield has declared that lumber conditions were the same as usual at this season of the year, and that not a single manufacturer or operator could be found who would admit that the tariff has anything to do with the present situation.

Secretary Redfield, in a letter to Mr. Humphreys, quoted from a report made to him by T. M. Robertson and William H. England, special agents of the Department of Commerce, following a visit to the State of Washington.

Some of the acacias, a group of trees with a world-circling range, are so valuable as a source of tannin and timber, says the Department of Agriculture in a bulletin recently issued, that their commercial cultivation in certain portions of the United States may prove extremely profitable. Aside from their value for tannin and lumber, the department goes on to say, they are well adapted to the reclamation of sandy and semi-desert lands, some species being able to thrive with only three inches of rainfall.

All told, there are about 450 species of acacias, 300 of which are Australian species and the rest scattered over the world, principally in Asia, Africa, and America. Australian acacias were introduced into California at about the same time the eucalypts were, and like

the latter have thrived there. Like the eucalypts, too, they are not resistant to frost.

With so many species of acacias there is naturally no form and no rate of growth that is common to the whole group. Some acacias are mere herbaceous plants; some are towering trees; most are shrubs, and some, in fact, are vines or climbers. The largest acacia grows more than 160 feet high, with a trunk clear of branches for 50 or 60 feet and a diameter of from 2 to 4 feet.

That the Federal Government assume jurisdiction over the Glacier National Park is one of the recommendations made by the superintendent of the Glacier National Park, in his annual report to Secretary Lane. Jurisdiction over the park has been ceded by the State of Montana but has never been accepted by the United States, although a bill providing for the acceptance of the jurisdiction has passed the Senate and is now pending in the House of Representatives. "Until such jurisdiction is accepted by Congress," says the Superintendent, "and laws made governing the park reservation, serious and endless confusion and annoyance will be encountered in administering the park rules and regulations."

A large class of students taking work in the forestry department at the Michigan Agricultural College spent their Christmas vacation in the lumbering districts of West Virginia studying the logging and milling operations of hemlock and spruce. The students were accompanied by Prof. F. H. Sanford and Instructor I. W. Gilson.

The headquarters were made in Davis and the operations on the holdings of the Babcock Lumber and Boom Company were studied very intensively. The timber being cut was some fifteen or eighteen miles from the mill and was mostly hemlock with some spruce, the remaining stand being maple, poplar, beech, birch, and a few gums. The company owns many thousand acres and has about six years cut standing. The stands average 25,000 to 30,000 board feet per acre and their mills

(hardwood and softwood) handle 30,000 to 100,000 board feet per day respectively.

The students had a train at their disposal and took trips to the woods every day where power skidding, animal skidding, felling, bucking, steam loading, road building, and track laying operations were studied. A full week was spent in the woods on the above-mentioned operations and then a trip was made over the whole area with the supply train. This completed the woods work.

The second week was spent in the mills. The work here comprised mill tallying, cost of materials and cost per thousand feet of the different operations, sawyers were checked, mills and the yards were mapped, and the planing, lath, and kindling mill operations were carefully studied. After completing the work the West Virginia Pulp and Paper Mill was visited and a whole day was spent studying the different operations there. The last day was spent in the Independent Tannery and some very interesting data were obtained in regard to the tannin content of different tree barks and nuts.

Other studies were planned but the time allowed was up and the boys packed up and left for Lansing, Michigan, and reached there at the beginning of the second week of school.

Arrangements have just been completed between several Granges and Schools in Rensselaer and Columbia counties, New York, and The New York State College of Forestry at Syracuse University for a number of illustrated lectures upon Forestry. Professor Russell T. Gheen, a graduate of the Department of Forestry of the Pennsylvania State College and now instructor in the College of Forestry, will speak before several granges in New York during March. Professor Gheen will have with him several sets of attractive lantern slides and will talk on such subjects as "The Reforestation of the Idle Lands of New York," "The Forests of New York Past and Present," "The Improvement of the Farm Woodlot" and "The Utilization of Waste Portions of the Farm by the Planting of Forest Trees."

The tenth annual meeting of the Ohio State Forestry Society was held in Columbus, Ohio, recently. A number of interesting addresses were given and all present were enthusiastic and felt they were doing a good work. The officers of last year were reelected: President, Wm. R. Lazenby, Columbus; Vice President, W. J. Green, Wooster; Secretary, J. J. Crumley, Wooster; Treasurer, H. C. Rogers, Mechanicsburg.

Three thousand acres of public timber land valued at nearly \$170,000 have been recovered by the Department of the Interior from those who had made fraudulent entries thereon. A long litigation was involved in this suit, which ended in favor of the Government in the Circuit Court of Appeals having jurisdiction of the Lewiston, Idaho, land district. This suit and six others

which were won in Idaho, Montana, and Oklahoma restored to the public domain a total of over four thousand acres. This culmination is in line with the announced policy of Secretary Lane, which is that of no compromise for those charged with public-land frauds.

Other suits brought by the Department of the Interior, in cooperation with the Department of Justice, during the month of December, 1913, were recommended for timber depredations on the public domain in Alabama, Florida and Mississippi, involving damages to the extent of over \$5,000.

Two judgments in favor of the Government in timber depredation cases were secured in Arkansas and Idaho. Two suits were recommended to set aside patents fraudulently acquired in Mississippi and Washington.

IMPORTANT FORESTRY LEGISLATION IN VIRGINIA

VIRGINIANS are making a determined effort to secure the passage of a bill looking toward the better protection and development of the forest interests of the State and the American Forestry Association is endeavoring to arouse interest throughout the State in the measure. Probably the first State in the Union to begin exploiting the forests and still ranking sixth as a lumber producing State, Virginia has never given any special care to the conservation and improvement of her forest resources. The best available information shows that fifteen million acres, or half of the State, are in forest, and no other State has more magnificent forests, yet few States have done less to preserve this great resource, that stands next to agriculture in value of products and labor, in the State.

The agricultural bill has provided in the past that the Commissioner of Agriculture shall investigate the forest resources of the State and recommend

measures for the better development of the forests. Under this act, \$10,000 has been spent in the past two years in fighting the chestnut blight, and two bulletins in cooperation with the Forest Service have recently been published on the wood using industries of the State, and on the management of short-leaf pine.

A bill to create the office of State Forester under the direction of the State Geological Commission was recently introduced into the Virginia legislature by Hon. J. G. Blackburn Smith, patron of the bill in the Senate. The bill has received much favorable comment from all parts of the State, from timber owners, lumbermen and allied interests. A public hearing was held in the Hall of the House of Delegates on Wednesday evening, February 25, before a joint session of the Committees on Mining and Agriculture of both houses. The hearing was well attended and much interest was shown. Among those who spoke in favor of

the bill were Senator Smith, T. B. Robertson, Delegate from Northampton, Dr. Lambeth of the University of Virginia, J. Girvin Peters, representing the Forest Service, and Samuel B. Detwiler, representing the American Forestry Association.

The bill, as originally introduced, provided for a separate forestry board and an appropriation of \$10,000 per year, but the sentiment of the State appears to be against the formation of new commissions. Accordingly a second bill was introduced by Senator Smith, placing the forestry work under the direction of the State Geological Commission (composed of the Governor, the president of the University of Virginia, the president of the Virginia Polytechnic Institute, the president of the Virginia Military Institute and one citizen from the State at large). Until 1916, the bill provides that the expenses incurred in the organization and operation of the forestry department are to be paid out of the budget of the University of Virginia.

The other provisions of the bill are very similar to those in the law now in successful operation in Kentucky. The principal powers conferred on the forestry commission by the bill are as follows:

1. The appointment of a technically trained man as State forester.
2. The commission has the power to purchase lands suitable for forest reserves at a price not exceeding \$10 per acre. It may establish a forest nursery and distribute seeds and seedlings to citizens under proper regulations. It also has the power to sell the dead, mature or large growth of trees on the forest reservations, and also the mineral rights.
3. The commission is empowered to carry on investigations in forest manage-

ment, to take measures to prevent the destruction of forests by fire (including cooperation with U. S. Forest Service and the appointment of forest wardens), and to assist public and private owners in the protection, management and replacement of timber. It is also provided that they shall investigate the streams and navigable rivers to determine methods, means and cost of improving the same, of preventing their pollution, of conserving the water supply, and of developing the power and other features by which the streams and rivers may be made of most value to the State.

4. The State Forester has supervision and direction of all forest interests in the jurisdiction of the State, including charge of forest wardens, enforcement of fire and other laws for the protection of woodlands, carrying on investigations of the forests and waters of the State, and of an educational campaign in the interest of forestry.

The patrons of the bill in the House of Delegates are John M. Steck, W. T. Oliver, N. E. Spessard, F. B. Robertson, J. H. C. Grasty, R. H. Willis and C. J. Duke.

The need in Virginia of an organized forestry department is so apparent and the bill provides for such a very modest start, that it is to be hoped that favorable action will be taken before the close of the legislative session on March 14. That there is much interest in the measure is shown by the fact that the present bill has had a favorable hearing and appears to have the approval of a great variety of interests from all parts of the State. Forestry bills introduced in 1906 and 1908, by Col. Eugene C. Massie, and ably championed by him, could not be brought to a hearing because of lack of interest.

Dr. B. E. Fernow, Dean of the Forest Faculty of the University of Toronto, is President of the Society of Canadian Foresters, a flourishing association of some fifty members, and was also recently elected President of the Society of American Foresters. The statement was inadvertently made in the February issue of AMERICAN FORESTRY that this latter organization was the only one of professional foresters in the Western hemisphere. Dr. Fernow calls attention to the fact that there are two.

The North-Eastern Forestry Company has moved its main office from New Haven, Conn., to the company's nursery at Cheshire.

FOREST FIRES CONTROLLED

DURING 1913 the forces on the national forests fought 4,520 fires, or nearly twice as many as started in 1912, the best year the forests have ever had.

Notwithstanding the great increase in the number of fires, Forester Graves considers that the showing made by the Forest Service was quite as favorable as that in the preceding year, because the damage done and the costs of fire fighting were no greater proportionately than in 1912. In both years practically 50 per cent of all fires were detected and extinguished before they burned over a quarter of an acre, and 25 per cent of both years' fires were put out before they covered 10 acres. Of last year's fires, 3,278, or considerably more than the whole number of fires in 1912, were confined to areas of less than 10 acres, and in 1,080 additional fires less than \$100 damage was done by each. In only 25 fires did the damage amount to \$1,000.

The aggregate loss in timber is estimated at nearly 59 million board feet, valued at about \$82,000, and the damage to young growth and forage is estimated at about \$110,000, making a total of about \$192,000. About 18 per cent of this loss, however, was incurred on private lands within the forests where 16 per cent of the fires had their origin.

One encouraging feature is that the total number of fires set by railroad locomotives was scarcely more than in the preceding year and represented only 12 per cent of all fires, as against nearly 19 per cent in 1912; also the proportion set by sawmills and other engines in the woods was considerably less than in 1912. This indicates very plainly, Mr. Graves says, that the public is awakening to the need of spark arresters and care with engines in the woods.

CAUSES OF INCREASE IN FIRES.

Looking for the reason of the increase in number of fires, the forester finds three main causes:

First of all, the unprecedented electric storms which swept the whole state of California at the end of a long dry season and set, almost simultaneously, about 700 fires. The 804 fires set by lightning in California formed nearly 50 per cent of the 1,628 fires on the national forests of the State from all causes, and were more than half of the 1,571 lightning-set fires in all the 21 states reporting.

In the second place, there were 757 fires which started outside the forests, of which 644 were stopped by the Government's fire fighters before they reached the forest boundaries, as against 424 which started on outside areas in 1912. However, the proportion of such fires to all those which the service battled with was about the same for 1912 and 1913.

The other increased cause of fires was incendiarism, but this increase was confined to three States, Arkansas, California, and Oregon, all others showing a marked decrease. Of the 452 incendiary fires, 128 were in Arkansas, 133 in California and 142 in Oregon, where two brothers were known to have set 72 on one forest alone. These two and other incendiaries were, of course, severely dealt with by the law. On the Arkansas forest, too, it has been assumed that the 351 fires classed under the general heading of "origin unknown" were mainly incendiary. In California the incendiary fires are largely attributable to what is known as the "light-burning theory," which advances the argument that forests should be burned over frequently to prevent the accumulation of debris. The Forest Service considers this a pernicious theory because it scars the standing timber and thus reduces its value; it robs the forest soil of its ability to retain moisture, and effectually prevents the reproduction of the forest, since such fires destroy all tree seedlings before they have a chance to get a good start.

LIGHTNING CAUSED MOST FIRES.

In 1912, lightning caused more fires

than any other agency, followed closely by railroads, campers and incendiaries, in the order given. In 1913, however, the fires caused by lightning outnumbered the next nearest cause by more than three to one, but the order—railroads, campers and incendiaries—remained the same as in 1912. A considerable decrease in the proportion set by railroads and campers indicates, according to forest officers, a growing carefulness on the part of the general public.

Last year, as in 1912, California led all others in number of fires, this lead being natural because California has such a long dry season. It was followed by Arkansas, Arizona and Oregon, in the order named. Kansas, which had only one fire in 1912, escaped without any in 1913. North Dakota repeated its record of 1912 and had no fires on its one small forest. Not a single severe fire occurred during the year in District 4, which includes Utah, Nevada, and southern Idaho, and in which a large proportion of the forests reported no fires at all.

LOSSES ON PRIVATE LANDS.

There was proportionately greater loss on private lands within the forest boundaries than on the public lands. It is pointed out by the forest officers that these lands cover approximately 11 per cent of the total area included within the forest boundaries, yet the area burned over on these private lands was more than 25 per cent of all. The Forest Service expended more than \$30,000 in protecting the private lands within the forests and lands adjacent

to and outside of the forests. In addition to this cost, services and supplies to the value of more than \$17,000 were contributed by cooperators for fire-fighting on these areas.

In the middle of the fire season, that is in July, the Service had high hopes of small fire damage during 1913, and this hope kept up until the middle of September, when the fire season on the national forests ordinarily is about at an end. At that time there was less damage than had ever been recorded, and only 2,260 fires as against 2,470 in 1912, with about 60,000 acres burned as compared with 230,000 in 1912 and 780,000 in 1911. At the end of the month, however, the electric storms in California and one or two outbreaks of incendiarism changed the whole situation.

But even in the face of these difficulties, the firefighting force, with its plans and experience from preceding years, was able to cope with the situation. In California, in particular, it was as if a military leader, represented by the District Forester at San Francisco, was holding, with a comparatively small number of men or a mere skirmish force, a line of defense extending 750 miles in a north and south direction. This force received, as if from an attack by the heavy artillery of an opposing army, the electric storms, generally unaccompanied by rain, which played havoc all along the Sierras and the Coast Range. That the California force was able to cope with the situation was, according to Mr. Graves, an evidence of the efficiency of the men and the organization.

The paper used by the government printing office each year requires approximately 125 million pounds of rag pulp and 490 million pounds of wood pulp.

F. A. Elliott, state forester of Oregon, says that cooperative fire patrol associations among lumbermen for prevention of forest fires have proved their worth.

Of 606 fires last year on the national forests of Arizona, New Mexico, and Oklahoma, more than one-half were caused by lightning. Campers set about one-tenth, and railroads one-twentieth.

Incense cedar is proving valuable for piling on the Pacific coast where marine borers are particularly troublesome.

NEED OF A FOREST LAW IN SOUTH CAROLINA

REPRESENTATIVES of the American Forestry Association, the Forest Service and the Southern Commercial Congress appeared recently before a committee of the South Carolina Legislature and urged the passage of a State forestry bill quite similar to the bill passed some time ago in Kentucky and now in successful operation there.

There is such a decided need for a forestry law in the State that the legislators are getting urgent demands from every county to give the proposed bill their earnest consideration. There is doubt, however, owing to the quickly approaching close of the session, as to whether the bill will get out of the hands of the committee. Its introduction has aroused so much interest, however, that if the bill does not pass at the present session it is almost certain to do so at the next session for by that time the American Forestry Association and other interests will have so impressed the people of the State with the need of a forestry law that the legislature will doubtless treat it as one of the most important measures before it.

J. Girvin Peters, chief of the office of State Cooperation in the Forest Service, outlined lucidly to the committee the situation in the State. He said:

"It is a wise policy and sound business for South Carolina to protect its forests, and in doing so it may secure the aid of the Federal Government. The value of these forests to the owners, to the wage earner and to the State is enormous.

"Lumbering is the second most important industry in South Carolina. The value of its products is not less than \$15,000,000 annually. Of this sum, about \$3,000,000 represents the value of the timber before it is cut. The remainder, approximately \$12,000,000, is the cost of manufacture, which goes principally in wages to the community. This industry employs over 15,000 wage earners, many of whom are skilled laborers.

"South Carolina has unique possibilities as a timber-producing State. Few other regions in the world are as favorable to tree growth as the one in which it lies. Climate and soil combine to produce the most valuable timber in the shortest time, provided fire and unwise cutting are kept in check. Nowhere else are there so many hardwood species, while its coniferous forests are among the most valuable in the United States. So great is the region's adaptability to forest growth that even worn-out farmland, no longer capable of supporting crops, will in time reclothe itself with trees, if only these can escape the ravages of fire.

"Fire is the forest's greatest enemy. Since the first settlement of this country it has destroyed as much timber as lumbering has utilized. Nor does it confine its damage to the forest growth—the old trees of the present stand and the young ones which should furnish us our forests in the future. It robs the soil of its fertility; it sweeps away the cover provided by Nature for the watersheds, increasing the danger both of floods and of low water in the streams; it impairs these streams' navigability; and it destroys property and interrupts business. A conservative estimate of the area burned over in South Carolina every year would be 400,000 acres, with a loss of nearly \$300,000. To this loss must be added that resulting from floods and low water, the extent of which is only too well known to every citizen of the State.

"When fire destroys the young growth in the forest it takes away from the State an important source of future wealth, just as in the destruction of the older trees it removes a present source. Upon the young growth depends the permanency of the lumber industry in South Carolina. If it is left to burn there will be no forest in the years to come to supply the needs of the many wood-using industries. Cut-over lands will remain valueless if the young reproduction which springs up after lumbering is not allowed to grow. Its protec-

tion, on the other hand, will mean that when the present crop of merchantable timber is removed there will be another to take its place.

"As a result of forest fires and consequent deterioration of the soil and elimination of the more valuable tree species, South Carolina today contains vast areas of unproductive waste land, or else land on which such valuable trees as white oak and yellow poplar have been supplanted by the black oaks and other inferior species.

"The blight of fire on the watersheds, which bares the slopes so that there is no impediment to run-off, is invariably reflected in the greater likelihood of floods and of low water. Very few States have as much at stake in the maintenance of an equitable streamflow as has South Carolina. Memory of the disastrous floods of 1903 is still fresh in your minds. So important does the Federal Government consider the relation of forest fires to streamflow that Congress enacted the so-called "Weeks Law," which appropriated \$200,000 for cooperative work with the various States in protecting forests on the watersheds of navigable streams. It also appropriated \$8,000,000 for the purchase of forested lands which are important in maintaining the navigability of water courses, and in purchasing such lands the Government pays a higher price for those which have not been badly burned than for tracts which have undergone the ravages of fire.

"If an example were sought of results which follow excessive destruction of timber and wasteful methods of handling it, it would be hard to find a better one than that presented by the history of the naval stores industry in South Carolina. From a sum reported to be nearly \$2,000,000 in 1879, the value of the naval stores products in South Carolina decreased to \$400,000 in 1909. The industry declined as the supply of longleaf pine steadily became scarcer. It can be rehabilitated only by protecting the remaining longleaf pine from fire and adopting proper methods of management. Starting in North Carolina, the industry moved to South Carolina, which at one time marked

the center of production. With the depletion of the timber resources in these two States, it moved again to Georgia, and is now concentrated in the pineries of Florida. Yet the permanency of the naval stores industry, which means so much to the prosperity of the Southern States and to the country at large, could have been maintained by the exercise of forethought and a little effort, especially on the part of the State.

"France is one of the largest producers of naval stores, and this result has been brought about not through a gift of Nature, but by the efforts of the French people. Something over a million acres of shifting sands have been transformed by the French Forest Service into a flourishing forest region which supplies all the naval stores of that country. In our own country the United States Forest Service is now experimenting on its National Forest in Florida with the maritime pine of France, which resembles our loblolly in rapidity of growth, and yields turpentine equal in quality to that from the fast disappearing longleaf. The experiments promise to go a long way toward solving the problem of reforesting our depleted Southern pineries, and I mention this instance and that of France merely to show that by taking the necessary measures it may be possible to renew and keep the naval stores industry in the Southern States, where it originated.

"South Carolina has a productive forest area of about 10,000,000 acres. On this area as a whole it is safe to say that the average annual production per acre does not amount to more than 75 board feet of log material. This means that the total annual growth of the forest of the State is something like 750,000,000 board feet of timber. The annual cut, on the other hand, is estimated at one billion board feet, which exceeds the annual growth by 250,000,000 feet. To put the fact in another way, one-third more timber is each year being taken from the forests of South Carolina than is being produced. And this does not take into consideration the large amount of material used for domestic purposes

such as fire wood and fence rails. With this drain continued it can readily be seen that the forest wealth of the State will eventually become exhausted.

"There is no need, however, for this to come about. By the application of forestry with fire protection as the first step, the annual growth could not only be made equal to the present cut, but it could in all probability be doubled, permitting a gradual increase in the cut without injury to the forest.

"An increase in the annual yield of only 10 board feet per acre would give an additional timber growth in South Carolina of 100,000,000 board feet. With a conservative sale value of \$15 per thousand when manufactured, this would mean an increased annual income from timber products of \$1,500,000 distributed principally among those who furnish the labor and materials for marketing the products. To obtain this increased income the State could well afford to invest an appropriation of \$10,000, \$20,000, or even \$30,000. Sums such as these would, moreover, be very cheap insurance for the protection

of standing timber estimated to be 30 billion board feet worth at least \$60,000,000 to the owners, and many times that to the people of the State if saved for manufacture.

"In framing forest legislation for South Carolina, one important fact should be kept in mind. Practically all the timber of the State is in the hands of private owners. If forestry is to be practiced in South Carolina, then, it must be by these same owners of forest land. For this reason the State should endeavor to make the practice of forestry by private owners as easy as possible by removing such a serious obstacle as lack of protection from fire. At the same time it should educate the owners of timberland, through actual cooperation with them, to the need of adopting practical forestry on their holdings. This should be South Carolina's chief aim in forestry. It can be accomplished by (1) the organization of a non-partisan forest department, (2) the appointment of a technically trained man as State forester, (3) the establishment of a fire protective system, and (4) an adequate appropriation of funds."

FIRE SEASON CLOSED

WITH the snows which fell early in January, the fire season in the southern Appalachian mountains has practically closed for this winter. The record of fires on the land which the government has acquired for national forests was much better during December than in November. During November forest officers reported 47 fires on or near government land, while in December there were only twelve. Of course, part of this decrease is due to the colder weather.

In all approximately 700,000 acres have been protected from fire during December. The total area burned over

will not exceed 300 acres; the foresters consider this, as compared with the acreage under protection, comparatively insignificant, and point out that it forms less than one-twentieth of one per cent of the area under protection.

During January and February, it was not necessary to employ any fire fighters or patrolmen. However, if the snow should disappear and the leaves get dry, patrol will be started again. The spring fire season usually opens about the first of March. From this time until the green vegetation is well established in May, it is necessary to patrol the woods with the greatest care.

LOBLOLLY PINE ADAPTED TO FORESTRY

THAT farmers and other land owners in Delaware, Maryland, and Virginia can put their worn-out or poorly drained land to profitable use by growing loblolly pine, is the statement made by the Department of Agriculture in a recent bulletin. For several generations, says the department, it will probably be better to grow timber on such areas, at little outlay, than to incur the heavy expense of making them fit for crops. At the same time, intensive agriculture can be practiced on the limited areas best adapted to it.

Loblolly pine, the department goes on to say, is easily the leading tree for commercial timber growing on the coastal plain of these three states, because of the ease with which it reproduces itself and forms pure, well-stocked stands, its rapid growth and the wide range of sites on which it will grow, the many uses to which its wood is adapted, the comparative cheapness of logging and milling the timber, and the good prices which its lumber brings.

The best stands of loblolly ought to yield a money return of anywhere between 4.5 and 10 per cent, on a 20-year rotation. On a 40-year rotation the best stands should bring in not less than 6 per cent, and perhaps 8 or 9.

The range of uses for loblolly is wide, and it is sold throughout the eastern and central states and exported to Europe and Central America. In building construction it is used for interior finish, flooring, ceiling, sashes, wainscoting, weather boarding, joists, lath and shingles. It also finds wide use for boxes, slack barrels, cheap furniture, woodenware and toys. In addition, it is used in bridge and trestle work and for freight cars. A good deal of loblolly pine is cut for cross-ties, which are given a preservative treatment. The wood is very easy to treat with chemical preservatives, and the recent development of wood impregnation processes and plants is rapidly increasing its use for many purposes. Few pines exceed it in use for fuel, and immense quantities of cordwood find a sale in cities as far north as Philadelphia. A report of the woods in Maryland in 1909 shows loblolly as exceeding all other woods combined in the manufacture of boxes and crates, and as standing second in cooperage and basket making.

According to the department, loblolly pine can be grown successfully in Kent and Sussex counties, Delaware; throughout eastern and southern Maryland; and in eastern Virginia.

STATE NEWS

New Jersey.

New Jersey is not letting up in her fight on the forest fires. Last year the fires were more in number than they were the year before and the damage done was somewhat greater, but the increase is accounted for by the fact that the spring was unusually dry and windy.

The records seem to prove that the State has a firm grip upon fires started by brush burners since only 7 per cent of the total number were due to that cause—and brush burning in the New Jersey catalogue embraces every form of intentional fire setting except incendiarism.

The season demonstrated again that the railroad hazard is the most serious. It is therefore, announced that from now on every

effort will be directed toward the prevention of such fires. The Fire Line Law, under which upwards of 300 miles of fire lines have been constructed by the railroads, having been declared unconstitutional, a new act was prepared which probably would stand the test of the courts, but after considering the whole situation it has been decided to introduce for enactment a brush disposal law and a fire patrol law. If both become effective the Forest Commission will be in a position to require the removal of all unusual hazards by those who are responsible. The brush disposal law will affect development projects (town lot schemes) in the main, since New Jersey's lumber industry is restricted. The patrol act will require any agency, whether railroad or other, to maintain a patrol when in the

judgment of the Forest Commission a dangerous hazard is found. Both these acts are believed to be more workable, because more elastic, than any other similar acts submitted for enactment in this country.

The campaign against violators of the law is pursued with undiminished vigor, and to New Jersey still belongs the credit of proving that a law against firing the forest can be enforced. The statement is made that during the year 1913, 350 violations were established, of which 39 were simply technical offenses, chiefly burning without a permit and starting back fires without the authority of a fire warden. In another form the statement is made that 52 per cent of all the fires started, 678, large and small, were traced to their authors and fixed as violations of the law. Of the 350 violations the railroads were responsible for 255, brush burners for 72, smokers for 8 and miscellaneous agents for 15. The money penalties recovered in these cases amounted to \$1,538.67 at the end of the fiscal year, October 31. Since that date further sums have been received on account of 1913 fires sufficient to make the total penalties collected approximately \$2,500.

Massachusetts.

The Massachusetts Forestry Association has offered a prize of a mile of street or road planted with shade trees to the town or city in Massachusetts which this spring plants the greatest number of shade trees in its streets in proportion to its population. Such a prize as this is to be based on the number of live trees of the spring planting when a count is made on September 15. At least fifty towns or cities must enter the contest, and already a large number have expressed the desire to do so. The mile of tree planting will require about two hundred trees.

Maine.

Prof. John M. Briscoe of the University of Maine announces that the camp course in forestry which he inaugurated last year will be continued this summer, and that he expects a large number of applicants. The course is for two weeks and many farmers and land owners take it. It gives them sufficient instruction in general forestry to answer for themselves questions about the best ways of reforesting their waste land; managing their woodlots so as to get the best income without destroying their productiveness; estimating their timber as to amount of it in board feet and its sale value, and protecting their woodlands from fire, insect depredations and fungus diseases. The only requirements for the course are that the student shall be over eighteen years of age and in good health.

The University is also introducing lecture courses on forestry in the normal schools of the State and giving special lectures to the Farmers Week and special short courses in the college.

North Carolina.

The North Carolina Forestry Association will hold its Fourth Annual Convention in

Asheville on Wednesday and Thursday, April 8th and 9th. Advantage is being taken of the fact that the meeting is being held in the mountains for the first time to arrange trips for the delegates to two of the most interesting types of forests to be found in the State. These are the forest plantations of the Biltmore Estate and the spruce forests on the slopes of Mount Mitchell, the highest peak east of the Rockies. The Appalachian Park Association and the Asheville Board of Trade are lending their hearty cooperation in arranging for the Convention and no effort will be spared to make this one of the most interesting and largely attended meetings ever held in the South.

The first meeting will be held on Wednesday morning in Hotel Langren, when the set program will be taken up. Prominent speakers are being secured for such subjects as State Forest Fire Prevention, Improving the Farm Woodland, Forests and the People, Shaping State Forestry Legislation, Publicity in Forestry, etc.

Wednesday afternoon will be taken up with a carriage drive to the pine plantations of the Biltmore Estate, where forestry has been practiced for a longer time than any other place in the United States. An evening session will be held at the Hotel Langren.

Thursday morning the delegates will be taken over the recently completed logging road of the Perley and Crockett Lumber Company, Black Mountain, into the spruce forests now being logged near Mount Mitchell and just outside of the Appalachian National Forest. A basket lunch will be provided. The return trip will be made in the afternoon in time for the delegates to catch both the east and west bound trains.

Publicity is to be the keynote of this Convention. It is hoped that some definite plan can be arranged to secure the support and, if possible, the pledge of the various candidates for the State Legislature who will be in the field during the coming summer preparatory to the general state election next November. North Carolina is badly in need of up-to-date forestry legislation and it is to be hoped that a General Assembly can be elected which will act favorably upon the bills advocated by the Forestry Association.

Rhode Island.

Jesse B. Mowry, Commissioner of Forestry for Rhode Island, writes: "Down to the middle of the 19th century the farmers got their limited supply of ready cash from the sale of hay, wood, charcoal and potatoes in Providence, and of milk, cheese, and butter to the local mill operatives. Those who had little streams on their farms erected gristmills, sawmills, and small shops for the manufacture of spools and bobbins which found a ready market in the cotton and woolen factories through Rhode Island. These little mills afforded the farmers a chance to work in winter and added to their incomes.

"The disappearance of the virgin timber, the drift of the farmers' boys cityward, and

the shifting of the grain producing industry westward, in the latter half of the last century, caused these mills to fall into innocuous desuetude. Some towns had as many as fifteen up-and-down sawmills, interesting remnants of which may be found today by the hunter who roams along the streams through the woods.

"Along with the State's development there is now springing up a new interest in corn, timber, electric transmission, and water-power—Earth's cleanest, cheapest, and best motive power, the possibilities of which in this State have never yet been even dreamed.

"Many a limpid trout brook which now unobstructed tumbles down 'to join the brimming river' will soon be harnessed to turn water wheels which in recent years have been greatly improved."

Michigan

Approximately one-half million trees were planted by the Public Domain Commission on the Michigan State Forests in 1913. Practically all of these are the native Norway pine raised in the Higgins Lake Forest Nursery, where about 1,500,000 more choice seedlings and transplants of Norway and White Pine are available for future reforestation projects. About 500,000 trees will be planted on the Higgins, Houghton, and Fife Lake State Forests during the coming spring.

The method of planting, as now practiced in all planting operations on the State Forests, is to prepare the ground by plowing shallow furrows into which the plants are set. Observations seem to indicate that such preparation of the ground decreases the death rate in the first year to a very small figure. The average death rate in the 1913 plantations was three and one-half per cent, the heaviest being but a little over four per cent. Fall planting resulted in a slightly heavier death rate than the spring planting. The average number of plants set per acre was 2,080, and the total average cost per acre, including plowing and cost of plants delivered to the site, was \$5.33.

Plans for the coming summer for the better protection of the State Forests against fires include the erection of a number of steel lookout towers. The Houghton Lake, Fife Lake and Lake Superior Forests are all to be equipped with such towers. Telephone lines will connect the towers with each other and with headquarters. Additional ranger stations are to be established on the Houghton Lake and Lake Superior Forests. Further protection will be afforded by the extension of the system of fire lines on each of the State Forests. The systems on the Higgins, Houghton, and Fife Lake Forests, on each of which there is now a considerable mileage of fire lines, will be brought to completion.

Pennsylvania

The Senior Class of the Forestry Department of the Pennsylvania State College, with Professor R. R. Chaffee in charge, left State

College on February 2, 1914, on their annual Lumbering Trip.

On their way to Galeton, Pa., the headquarters for the first week, the party visited the Asaph State Nurseries at Asaph, Pa. At Galeton they made many side trips among which were the visits to the basket factory of Guile and Windnagle at Gaines, the Gaffney Chemical Company at Walton, the National Chemical Company at Lyman Run, the Telescope Cot and Novelty Company at Telescope. The boys derived much benefit from the Galeton Stave and Heading Company's works, and the Pennsylvania Wood Company. A study was made of the sawmill of the Central Pennsylvania Lumber Company and the Emporium Lumber Company. At the several camps to which the boys had access on the holdings of the C. P. L. Company, they had a good chance to see both earth and timber slides; also portable slides invented by F. P. Sykes, Woods Superintendent of the Emporium Lumber Company. While in Galeton the Seniors were fortunate in having the opportunity to hear an address by H. P. Welsh, General Superintendent of the C. P. L. Lumber Company, on "the History of Hemlock Logging in Northern Pennsylvania." Mr. W. W. Lowell, Local Superintendent of the Pennsylvania Lumber Company also addressed the boys.

On February 7 the party left Galeton in a special car, "Callao," for Penn Yan, New York, where they visited the basket factories of Guile and Windnagle and of the Yates Lumber Company.

From this point the boys continued to Lake Clear, New York, where they were met by Edward Patnode who is in charge of the nurseries at Lake Clear and the plantations in that vicinity.

Here the morning was spent in a most interesting and instructive visit to these different plantations both at Lake Clear and Saranac. This chance to see the New York State Nurseries gave the boys a large field of opportunity to see just what is accomplished in that special phase of Forestry work. The courtesy extended to them was fully appreciated by all.

In the evening the party returned to Tupper Lake, where they were the guests of the Santa Clara Lumber Company for the following week. Many interesting side trips were taken, and three days of the stay were spent in the camps of the company on Cold River.

During the week spent at Tupper Lake several instructive talks were given to the boys, among which were addresses by James L. Jacobs, General Superintendent of the Santa Clara Lumber Company, John L. Graham, operator, and Charles H. Cooper, representing the Henry Disston Co., and George McA. Gilbert, Vice President of Ryther and Pringle Company, manufacturers of the Barienger Brake which has been successfully used by the Santa Clara Lumber Company.

On February 14 the party returned to State College after a thoroughly successful trip in every way.

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POSITION WANTED.—On private estate: By forester now in U. S. Forest Service. Understands all branches of tree surgery, surveying, drainage, road building, bridges and culverts, concreting and landscape. Best of references furnished. H. M. C., Care AMERICAN FORESTRY.

FORESTER of technical training and practical experience in the United States and Germany wishes to better position. Best reference from German Aferforster and others. Address "S," Care AMERICAN FORESTRY.

WANTED—Situation as Woods Superintendent on private estate or hunting preserve, by graduate Forest Engineer with thorough experience and training, both here and abroad, in forest management and the proper care of woods and game. Well recommended. Address, MANAGER, Care AMERICAN FORESTRY.

WANTED—BY a graduate forester, a position on reforestation work, or with a landscape gardening firm. Experience Northeastern. References if desired. Address "S. D. H.," Care AMERICAN FORESTRY.

FORESTER with technical training and with several years' experience in administrative work and teaching, desires position along either of these lines. Address "B," Care AMERICAN FORESTRY.

FOREST ENGINEER—Best of American and European training. Five years of practical work along lines of organization, administration, protection, cruising and appraising. Would like position with some large timber holding company, railroad, or municipal watershed. Best of references. Address "CRUISER," Care AMERICAN FORESTRY.

A forest school graduate with experience in U. S. Forest Service and with lumber company, also possessing thorough business training, will consider offer of a good forestry position. Address M., Care AMERICAN FORESTRY.

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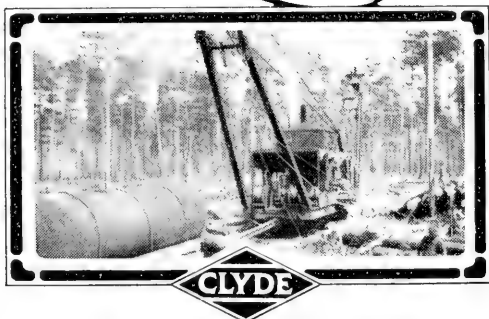
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APRIL 1914

No. 4

WOOD VERSUS SOME OF ITS SUBSTITUTES
THE HARDWOOD FORESTS OF SOUTH AMERICA
FORESTRY ON THE COUNTRY ESTATE
PLANTING AND SEEDING OF WOODLOTS
PROGRESS IN BRITISH COLUMBIA
A NEW TYPE OF FIRE LINE

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American Forestry

The Magazine of the American Forestry Association

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April	CONTENTS	1914
WOOD VERSUS SOME OF ITS SUBSTITUTES—By R. C. Bryant.....	239	
With five illustrations.		
HARDWOOD FORESTS OF SOUTH AMERICA—By H. G. Cutler.....	248	
With eleven illustrations.		
WARNINGS AGAINST FOREST FIRES.....	260	
FORESTRY ON THE COUNTRY ESTATE—By Warren H. Miller.....	261	
With six illustrations.		
A MAN TO A TREE (POEM)—By Gertrude Cornwell Hopkins.....	267	
ONE VIEW OF THE FOREST RANGER—By Paul G. Redington.....	268	
With two illustrations.		
PROGRESS IN BRITISH COLUMBIA—By Overton Westfeldt Price.....	273	
With four illustrations.		
DEDICATION OF A FORESTRY BUILDING.....	279	
With one illustration.		
A NEW TYPE OF FIRE LINE—By M. A. Benedict.....	281	
With six illustrations.		
PLANTING AND SEEDING OF WOODLOTS—By George Latta Barrus.....	287	
With eleven illustrations.		
THE HARDWOODS OF THE SPESSARTS—By F. F. Moon.....	298	
With three illustrations.		
SALT LAKE PRESERVES TIMBERS.....	302	
CARE OF SHADE TREES.....	302	
MARYLAND CONSERVATION ASSOCIATION.....	303	
GEORGE W. VANDERBILT DEAD.....	303	
HOW TO SAVE \$100,000,000 A YEAR.....	304	
A NEW SOAP MATERIAL.....	306	
WHITE PINE GROWING PROFITABLE.....	306	
BEST SEED YEAR FOR LONGLEAF PINE.....	307	
WINTER FOREST FIRES.....	308	
THE FOREST RANGER (A POEM)—By P. C. Smith.....	308	
AMERICAN FORESTRY ASSOCIATION EXHIBIT.....	309	
FOREST NOTES.....	309	
BOOK REVIEWS.....	311	
STATE NEWS.....	312	
CURRENT LITERATURE.....	314	

AMERICAN FORESTRY is published monthly by the American Forestry Association.
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Declaration of Principles and Policy of the American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies:

FEDERAL ADMINISTRATION AND MANAGEMENT of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

STATE ACTIVITY by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.

FOREST FIRE PROTECTION by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

FOREST PLANTING by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

FOREST TAXATION REFORMS removing unjust burdens from owners of growing timber.

CLOSER UTILIZATION in logging and manufacturing without loss to owner; aid to lumbermen in achieving this.

CUTTING OF MATURE TIMBER where and as the domestic market demands it, except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.

EQUAL PROTECTION to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

CLASSIFICATION by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

American Forestry

VOL XX

APRIL, 1914

No. 4

WOOD VERSUS SOME OF ITS SUBSTITUTES

By R. C. BRYANT

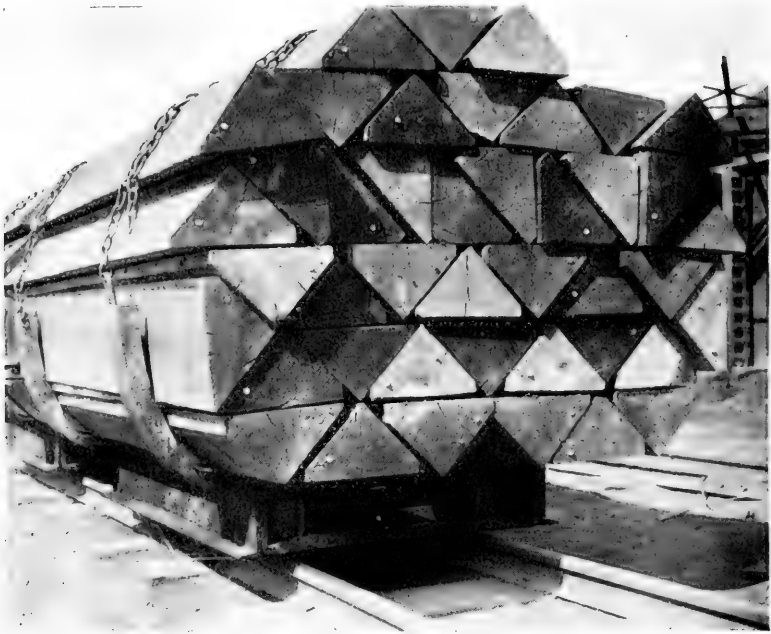
THE lumber industry has begun to view with alarm the rapid encroachments which substitutes for wood have made and still continue to make in the field of wood products. This inroad is not confined to any particular kind of wood or class of material, but it has been felt most keenly in the inferior grades of lumber which have been consumed in immense quantities for boxes, crates, and innumerable other purposes.

Economy and the public welfare demand that we use in a conservative manner the resources at our command and therefore, the substitution of steel, concrete or other materials is to be commended where the public at large is benefited either directly or indirectly. There are instances, however, where it is not for the public interest to make such changes, since the final result is not an economic gain but a loss.

The substitution of other building materials for the high-grade lumber formerly used may be justified in some cases on the grounds that better wood material was used than was necessary or that the demands for the high-grade lumber by new or expanded forms of industry has so increased that our depleted forests are unable to supply certain kinds of material in sufficient quantities to meet the public needs in those industries unless retrenchment is made where it will be least felt. It is an economic waste to use better wood materials than are required for a specific purpose, but it is regarded as a direct economic loss when low grade woods suitable only for a few specific purposes are displaced by substitutes and the wood product thereby rendered

of such low value that the lumberman can not market it, and therefore destroys it at his manufacturing plant or else leaves the timber in the forest to rot.

The extent to which close utilization of stumpage can be effected is dependent directly on the markets for and the prices which can be secured for the low-grade material which comprises more than 50 per cent of the lumber cut of the United States. The lumberman removes from the forest only as much of the stand as he believes can be marketed at a profit, although every defective log may contain some cull material which must be handled in order to secure the higher grade lumber on which a profit can be made. The last few years has seen a marked change in the character and amount of timber which is taken from a given acre of land, a fact well illustrated in the southern pine region. Where formerly only the choicest trees and the best logs from these same trees were taken, lumbermen have now reached a point, due to higher stumpage values and increased market prices for lumber, where the entire stand of pine is removed down to a diameter of from twelve to fourteen inches, in some cases still lower; where low stumps are cut and where defective and knotty top logs are taken to the mill. The yield per acre for stands of the same character has increased from four hundred to five hundred per cent for the above reasons. It is a mistaken theory to assume that a competition in low-grade lumber, which comprises much of this increased yield per acre, reduces the lumber cut and thereby prolongs the life of the operation. On the contrary, the reverse is true, since



TRUCK LOAD OF TRIANGULAR CROSS TIES READY FOR TREATMENT AT THE GREAT NORTHERN RAILWAY CO.'S TREATING PLANT, SOMERS, FLATHEAD COUNTY, MONTANA.

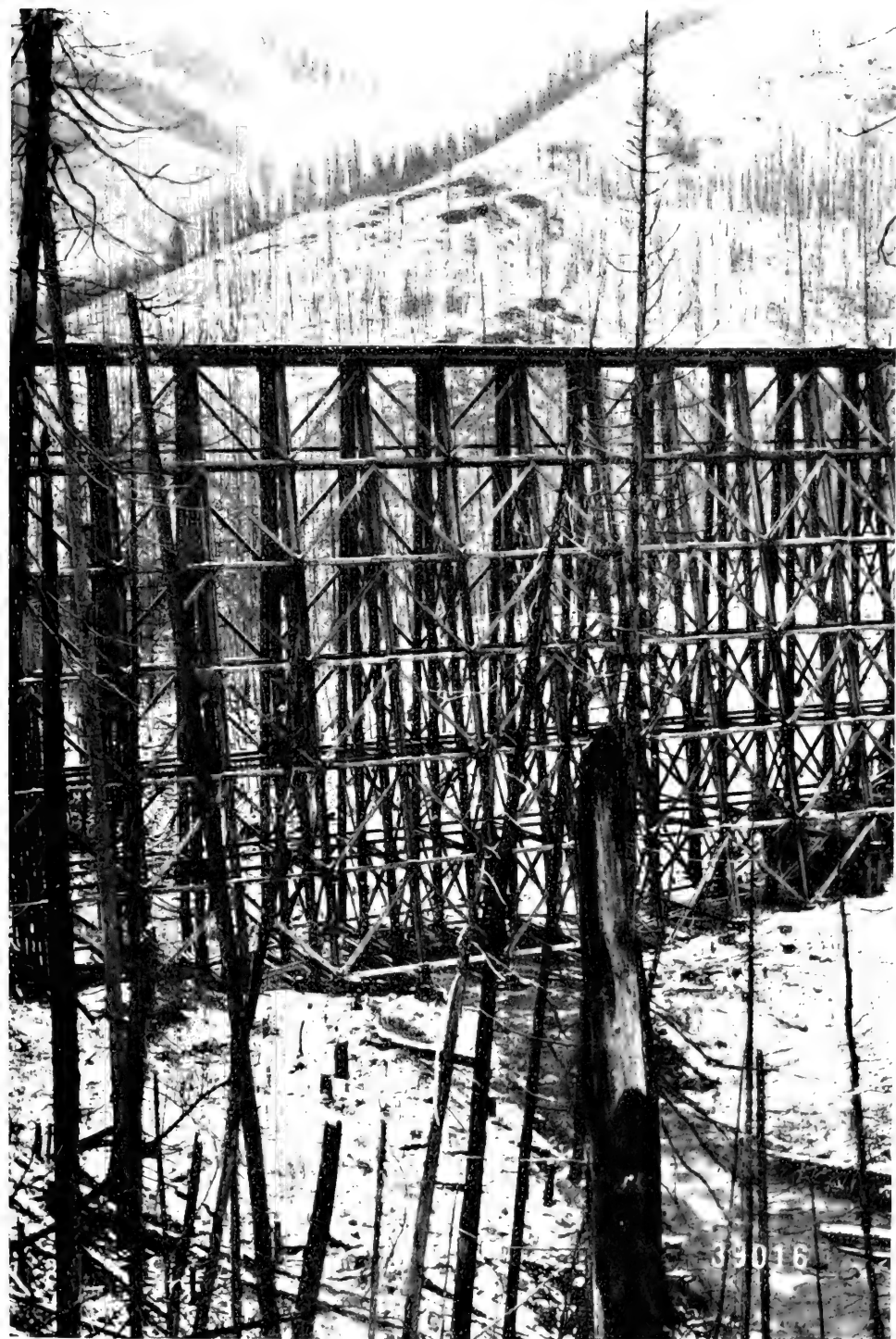
the annual output of a large lumber manufacturing plant is more or less regulated by the investment, and the operator who has large carrying charges to meet both on the investment in the raw product and in plant facilities will still maintain his average output, but will leave in the forest to rot such material as can not be sold at a profit. This means that all of the usable material is not removed and the lumberman, therefore, must cut over a greater acreage to secure the amount of raw product he requires. This hastens the exhaustion of his timber supply and likewise affects every citizen who in the future must use wood.

It is essential both from the standpoint of national economy as well as from the direct standpoint of forestry that this material shall continue to find a profitable market in addition to the saplings and other small material which may result from the thinning of artificial forests. We are all, therefore, vitally interested, or should be, in the creation and maintenance of profitable markets for this class of material.

The marketing of high-grade lumber is not so difficult since there is a steady demand for this class of material, and as timber becomes scarcer the problem of placing the better grades on the market will become more simple even than it is today.

One of the largest markets for low grade material and for trimmings from the sawmill and the planing mill has been in the manufacture of crates and boxes for holding all sorts of vegetables, canned goods, soap, starch, crackers, etc. A recent estimate of the Secretary-Manager of the National Lumber Manufacturers' Association places the annual consumption of wood for the above and similar purposes at more than six billion feet, or about 20 per cent of the total lumber production of the entire country. Much of this lumber was not valuable for other purposes, and if it had not been used as stated the logs which contained it either would have been left in the forest, or the lumber of box quality would have been burned at the mill.

The importance of the box trade to



TRESTLE BUILT OF TIMBER CUT AND SAWED IN THE VICINITY ON LINE OF GREAT NORTHERN RAILWAY, FLATHEAD, MONTANA.

FOR TRESTLES AND BRIDGES WOOD HAS BEEN SUPERSEDED BY STEEL, CONCRETE, AND MASONRY. YET IN PIONEER CONSTRUCTION THROUGH TIMBERED COUNTRY THE WOODEN TRESTLE STILL HOLDS ITS OWN.



UNTREATED TIES PILED IN YARD AND TRAM TRACKS, ESCANABA, DELTA COUNTY, MICHIGAN.
There has never been a successful substitute for the wooden tie and engineers are willing to admit there never can be. When treated with preservatives a large measure of permanence is added to their other good qualities.

certain sections of the country may be better appreciated when it is stated that from 20 to 25 per cent of the eastern white pine, from 25 to 30 per cent of the California white pine, 2 per cent of the spruce, 75 per cent of the hemlock of Wisconsin, Michigan and Pennsylvania, and 20 per cent of the yellow pine is made into containers of various sorts. A recent authority credits the cracker industry with having used 75 million feet of lumber for cracker boxes in 1912, canned goods packers 350 million feet, piano box manufacturers 250 million feet, apple box manufacturers 200 million feet, soap box makers from 75 to 100 million feet, starch box manufacturers from 75 to 100 million feet, fruit and vegetable package manufacturers from 150 to 200 million feet, and boxes for standard oil products 300 million feet.

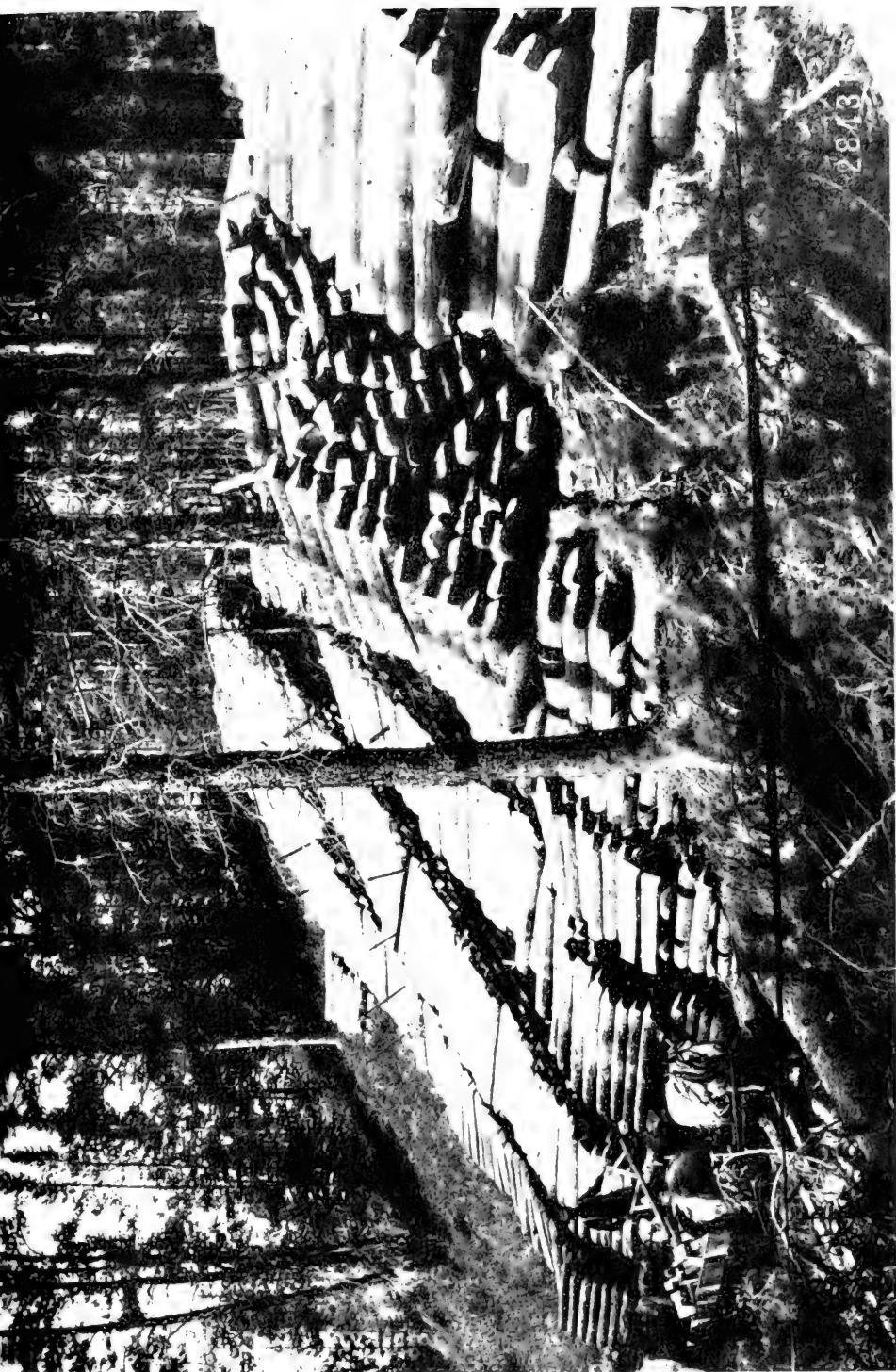
The lumbermen have within the last few years become greatly alarmed over the heavy inroads fiber boxes have made into their trade and have been endeavoring to hold their market at any cost.

They have only met with a partial measure of success, since the fiber package is lighter in weight and its sale has been more widely and persistently pushed than has the wooden box.

Another important product which is now being discriminated against in some sections is the wooden shingle. This had been one of the most common forms of roof covering in use in this country and for many years its value for this purpose was unquestioned both from the standpoint of wearing quality and of cost. There are today few if any roof coverings which give such good satisfaction, which can be placed on a building for as low a cost, which can be repaired as cheaply and readily and which give greater value for the money than do first class wooden shingles.

They have been discriminated against in some cities on account of the fire hazard which is supposed to attend their use but which has undoubtedly been exaggerated, at least in some cases.

The chief competitors of shingles are a host of prepared roofings of a wide



TIES SKIDDER READY FOR SHIPMENT DOWN A FLUME.

range of quality; tin and galvanized iron; asbestos shingles; slate and tile, etc. The most serious competitor is that with prepared roofing and metal roofing. There are several reasons for this, some of which may be ascribed to the shingles themselves, the others to outside agencies. Among them may be mentioned the reduced life of the present-day shingle roof owing to the use of wire nails which rust off in a few years; in some instances to improper kiln-drying at the plants which takes the "life" out of the shingles and makes them inferior in quality.

A very important feature in connection with the substitution of materials other than wood for roof coverings has been the apathy of the shingle manufacturers on the one hand, and the strenuous advertising campaign of the substitute manufacturers on the other. The producers of all kinds of wood products for years devoted very little attention to the advertising of their wares. The introduction of substitutes, especially steel and concrete, as building materials did not seem to awaken the lumbermen from their indifference to advertising, and before they were fully aware of what had happened the substitutes had gained such a strong hold on the builder that it could not be overcome. The lumber manufacturers now appreciate that the lumber trade can be saved only by creating a desire for lumber on the part of the public. Sectional advertising campaigns have been conducted by lumber interests for some years and it is now being taken up by the lumber industry as a national problem.

Shingle men, in spite of the inroads that have been made on their business, have not yet shown as great activity in pushing their product as have their chief competitors. Every magazine today contains from one to several advertisements of substitutes for wooden shingles and, further, a strong personal effort is put forth by firms manufacturing such goods to get in touch with the retail dealer who sells roof coverings, offering special inducements to carry a stock and also to push the product. All of these things must be done to intro-

duce a new product which is to displace an old well-established article. The shingle man on the other hand usually has a smaller business organization, less funds for advertising purposes and has allowed his competitors to enter the field without a struggle.

However, the shingle makers at last realize that they have delayed too long, and the struggle for supremacy is now on, being manifested by the effort made by some cities to prevent the use of shingles in them and the opposition to this ruling on the part of shingle manufacturers and dealers who are now engaged in a strenuous effort to produce a fire-retardant paint which will decrease the fire risk of wooden roofing and permit the use of shingles. This problem is still far from a satisfactory solution, but it is believed that the efforts now being put forth will result, at least, in a fair measure of success and make it possible to again use shingles in most of the cities which have recently passed ordinances prohibiting their use. From the standpoint of forest conservation it is very desirable that a wider field for sale and a greater demand for shingle consumption should be secured since the waste in shingle manufacture is now very great. The West, which produces a very large per cent of the total number of shingles manufactured in the country, is far removed from the great consuming centers of the middle West and the Eastern States and on account of the high freight rates into the territory east of the Rocky Mountains and the keen competition with the various substitutes, the shingle producers of the Pacific Coast find it profitable to manufacture only the best grades of shingles. It is hoped that the opening of the Panama Canal may improve the conditions under which western shingles are marketed and thus permit a closer utilization of the red cedar of the West.

Lath are a by-product in nearly every large sawmill, being made from slabs and edgings which otherwise would be consumed in a refuse burner at an expense to the lumber manufacturer. It is very desirable that the manufacturer of lath shall continue since there is not a market for much of the



GROVE OF HARDY CATALPA ON PLACE OF MRS. F. W. KRUCKMAN, 14 YEARS FROM SEED. WEBSTER CO., IOWA.
FENCE POSTS CAN STILL BE GROWN AT AN ECONOMIC ADVANTAGE AND WITH DECAY-RESISTING MATERIAL ARE CHEAPER
AND EASIER TO HANDLE THAN ANY SUBSTITUTE.

rough material in any other form. The introduction of various metal substitutes for lath threatens to restrict the market for the wood product, causing a waste of raw material at the mill.

Another field in which wood formerly reigned supreme but which is now gradually being usurped by substitutes is that of fence posts. It is almost universally recognized that the wood fence post is the most satisfactory form of fence support, because of the ease with which it can be placed in position, and the fence material attached to it, and the facility with which fence repairs may be made. The comparatively short life of posts made from some species of trees, and the increasing cost of posts made from the more desirable species has led to the introduction of substitutes both of concrete and of steel. The greatest market for the substitutes has been and probably will continue to be in the great agricultural section of the Middle West which is largely devoid of forest areas from which fence posts

may be secured in large quantities. The high cost of wooden posts shipped into the region from distant points makes the prairie States a lucrative field for the concrete or metal posts. The concrete post is probably the more popular with agriculturists since it can be made on the farm at a reasonable cost. It is believed, however, that the future development of farm forestry will increase the consumption of wooden posts since each farmer may devote a limited area to the production of such fence posts as he requires from fast growing species which are capable of treatment with chemical preservatives at a reasonable cost.

For a great many years millions of feet of lumber were annually consumed in the construction and repair of sidewalks in the smaller cities and in the villages of the country. The first competitor of wood for walks was the brick, which made a more durable structure, but which had many unsatisfactory features after it had been laid for some

years. Since the advent of concrete, wooden and brick walks have, to a very large extent, been replaced by structures made from it, which is far more satisfactory than either. This substitution of concrete for wood has been a desirable thing since it has reduced the consumption of a high grade of lumber which has since found a strong demand for other lines of construction.

Another field in which wood is being largely replaced is in the construction of small bridges and culverts on public highways. Formerly these were constructed almost exclusively of wood. Cheap transportation to market for agricultural products is one of the first requisites for the farmer and this has brought about the construction of a very large mileage of low-grade macadamized roads of permanent character. The small bridges and culverts are being given a greater permanency than formerly by constructing them of concrete. While more expensive than wooden structures, if properly built, they are more permanent in character and reduce the cost of road maintenance. This is in line with efficiency and is desirable from every point of view.

One of the largest consumers of lumber is the railroad industry which has need of immense quantities of wood for crossties, bridge timbers, buildings, car construction, sign boards, and like uses.

The crosstie situation has been a pressing one with railroad companies for many years due to the rapidly increasing price of durable woods and the greatly diminished supply. For years repeated efforts have been made to perfect a tie made from material other than wood, which would fulfil the railroads' needs, but so far the results have not been satisfactory. Steel ties of various patterns have been patented and numerous forms of reinforced concrete ones have been offered but all have so far been pronounced undesirable. The difficulty appears to be that metal or concrete ties are too rigid and unyielding and therefore are hard on the locomotives; that steel ties become brittle and break under the continuous pounding of heavy traffic and that concrete ties disintegrate both through the action

of frost and the continuous pounding of heavy traffic.

There does not appear to be any substitute for wooden ties which can meet the requirements. The main drawback to the wood crosstie being its non-durable quality. The problem is now being solved by the use of inferior species of woods and treating them with some form of chemical preservative which if properly done renders them immune to decay. The preservative treatment of a large number of species which could not be used untreated has opened up a large source of supply hitherto inaccessible and is going a large way towards solving the problem for the railway transportation companies of the country.

The lumber industry has not been so fortunate in holding the railroad trade in large timbers for bridge construction, since steel has largely replaced wood in large structures and concrete in the smaller ones. This can not be regarded as a serious calamity, however, at least from the public point of view since a steel or concrete structure if properly constructed and cared for is more lasting than the ordinary structures of wood, and therefore is to be preferred for this purpose since in the long run it will aid in prolonging the time when the supply of large trees, from which railroad bridge timbers must be cut, will be exhausted.

Railroads still consume large quantities of lumber for stations and other buildings although the railroads are coming more and more to construct such buildings of brick or concrete because of the more durable character of the structure.

The construction of cars for years has required a very large amount of lumber, but today the demands for wood for this purpose are decreasing, due to the increased use of steel for the construction both of passenger and freight cars. The average size box car if constructed of wood requires about 6,500 board feet of lumber, and the average size gondola, coke or ore cars, 4,000 feet. In 1911 an estimate of the number of cars exclusive of passenger, which were constructed, was about

180,000, of which number 60,000 were gondola, coke or ore cars, and 120,000 box cars. Had these been constructed of wood as they were formerly the total lumber requirement for these cars alone would have been in excess of one billion feet. As a matter of fact, however, practically all of the gondola, coke and ore cars were constructed of steel and 80 per cent of the box cars had a steel underframe which reduced the amount of lumber required from 6,500 board feet per car to 4,000 board feet per car, so that the actual lumber consumption was 540,000,000 board feet, about one-half of what it would have been had the entire car been of wood. This loss of a market for 1.35 per cent of the total lumber cut of the country has been felt by the lumber industry to some extent but the result was not unforseen on their part since it is admitted by all experts that a steel-frame car is superior to a wooden one. All are not yet agreed, however, that an all-steel car is a safer or better car than the steel-frame wooden car. The abandonment of the wooden frame is in line with modern progress as regards safety and as such should be encouraged, but in justice to lumber manufacturers the public should not commit itself to the all-steel passenger car and freight car until the matter has been decided by impartial experts.

Another interesting example of substitution of metal for wood is in the manufacture of office furniture, including desks, filing cabinets, and chairs. These have little merit over wood, since it is doubtful if they are fireproof in character and further when injured or sprung in any part of the structure it is difficult to repair. The steel furniture trade has not yet made great inroads on the product made from wood and will probably never command more than a limited share of the furniture business, since a large percentage of the average furniture sells for a price below that for which steel articles of the same character could be marketed.

Strong efforts have been made in some cities especially in New York, to forbid the use of wood interior trim in buildings more than a specified number of stories in height. The plea on which ordinances of this character are introduced is the reduction of the fire danger. The passage of such an ordinance would be an act of injustice to those who handle wood, and an exhibit of favoritism to those concerns which now manufacture metal interior trim. It is yet to be proved that the very limited amount of wood now used for trim in a large office building is a distinct fire menace or that it increases the fire risk. In case this is true, it is possible to so treat wood with a fire-retardant that the danger that may exist is eliminated.

There has been a tendency for some time past to substitute concrete floors for wooden ones in factory construction, on the plea of greater durability and of decreased fire risk. This has appreciably reduced the amount of wood flooring materials demanded for this purpose. The concrete floors, however, have not met all of the requirements for a satisfactory floor, since they are harder upon the workmen who must travel continually back and forth upon them; they have a deleterious effect upon the health of employees who must stand upon the cold surface during working hours; and the dust which arises from the gradual wearing of the floor settles on the bearings of machinery and causes a greater wear than where wooden floors are used. The many advantages of the wooden floor will undoubtedly enable it to hold its own in the future, and it is believed in many factories which still insist on a concrete subfloor will in the future employ a top covering of wood.

The public should give the lumbermen every encouragement possible to utilize to the fullest extent his forest resources and thereby eliminate the economic loss which results from a reduced market for low grade products.

HARDWOOD FORESTS OF SOUTHERN SOUTH AMERICA

By H. G. CUTLER

NATIONS are slower to learn by experience than even individuals. Perhaps because small bodies move more rapidly than the massive ones. But isn't it a fact, throwing the cause aside?

If I shall have the privilege in the great hereafter of viewing the progress of mundane affairs, I know that I shall be curious to know how long it will be before the nations of the earth will appreciate the blessings which nature has showered upon them, and not, in the mere gluttony of the good things of life, scatter them to the winds with wanton wickedness. In spite of the warnings which have come to the older sinners of the earth, such as Germany, France, the United States and others who have seen the error of their ways, Argentina and Paraguay, which embrace the cream of the hardwood forests of southern South America, are allowing them to melt away before the onslaught of land, railway and manufacturing corporations.

The strong soil has presented the southern republics with vast forests of quebracho, cypress, oak, cedar and lignum vitae, as well as those varieties which are her own special offspring—coigue, alerce and manu—and, in repayment of this generosity, the governments of men have allowed them to be ravished at will, for the payment of paltry sums and in blind forgetfulness of the future. But they say, "Sufficient unto the day is the evil thereof. Why worry? We need the money to live on. The future has always taken care of itself in some way."

True. Nature has always been very good to mankind, in view of how mankind has treated nature. When the forests commenced to thin out, Coal began to yield his treasures. Coal gets to be too cumbersome to be carried into every nook of the universe, and is altogether absent in such great lands



AN INDIAN OF THE CHACO HARDWOOD FORESTS.

as Argentina, and petroleum flows from the bowels of the earth into the furnaces of war ships, factories and residences. Nature has been a thoughtful, tender mother to careless, ungrateful children. Is it not time that the new, undeveloped nations show their gratitude to her by refusing, from the first, to waste their lives in riotous living?

Along this line is the following from a publication issued from Buenos Aires, the splendid capital of Argentina and financial center of the great companies which are especially exploiting the vast forests of quebracho in the northern and northeastern sections of the republic: "Attention has been repeatedly called to the danger of the extinction of the quebracho, as little or no check has been placed on the reckless methods of forest exploitation in vogue for many years past. If these are still permitted, according to a very high Argentine



LOADING QUEBRACHO LOGS (ROLLIZOS).

IN THE EARLY DAYS OF THE TIMBER INDUSTRY OF "THE CHACO," THE NATIVE WAY OF HANDLING LOGS WAS VERY PRIMITIVE. THE OLD TWO-WHEELED CART IS NOW DISPLACED BY SUBSTANTIAL WAGONS, HOWEVER, AND THE WORK IS CARRIED ON EXPEDITIOUSLY.



LOADING QUEBRACHO LOGS ON A LOCAL RAILWAY.

QUEBRACHO INDUSTRIAL COMPANIES HAVE INTRODUCED ALL MODERN IMPROVEMENTS IN HANDLING THEIR PRODUCT, AND HAVE LAID SMALL RAILWAYS INTO THE FOREST, ON WHICH LOGS ARE CARRIED TO THE MILL AND THENCE TO THE TRUNK LINES OF PARAGUAY AND ARGENTINA.



THE EDGE OF "THE CHACO" IN ARGENTINA.

THIS IS AN OUTLYING VILLAGE CELEBRATING THE NATIONAL HOLIDAY (MAY 25). FROM HERE THE WORKMEN SKILLED IN WOODCRAFT JOURNEY INTO THE WILDERNESS IN SEARCH OF QUEBRACHO.

authority, few existing quebracho trees will be left standing, as no provision for future systematic planting is being made. There is a constant outcry in the native press for the passing of improved forestry laws, but as yet this very pressing matter has not obtained its share of consideration from Congress. Not only the quebracho, but many other valuable species of trees with which the vast forests of the republic abound, are in danger of extinction in the not very distant future as the result of inadequate forestry laws. It is a matter for wonder that the several foreign companies having large capital invested in the exploitation of the quebracho have not shown systematic regard for their own future interests.

"The red quebracho furnishes a hard, close-fibred wood, which is chiefly used for railway sleepers and fencing posts and for the extraction of the tannin, in which it is very rich. Its adaptability for sleepers and posts is first class.

"In the matter of railway sleepers the exports of quebracho logs has been constantly diminishing since 1900. In a

much less degree there has been a shrinkage in the number of sleepers used by the Argentine railway companies. The chief cause of this decrease is the competition of steel sleepers. As to the comparative economical advantages of these latter for use in Argentine, expert opinions vary. It may be noted, however, that the provision of the law under which railway companies are permitted to import material duty free is an important factor in the rivalry of steel and quebracho sleepers. Neither Europe nor the United States has ever imported considerable quantities of sleepers from Argentina, and these overseas imports have ceased entirely since 1903. Uruguay and Brazil have been the best customers, with a gradual decline even in their trade.

"The general increase in the exportation of logs is explained by the growing appreciation abroad of the fine qualities of the timber for fencing, building and cabinet-making. It is dense and compact of fibre and water-resisting, besides which its mahogany color contributes to handsome decoration and it takes a



AN ASSEMBLING POINT FOR QUEBRACHO LOGS.

NEWLY FELLED LOGS OF QUEBRACHO ARE HAULED TO THE NEAREST STATION OR MILL BY OXEN IN THE PRIMITIVE METHOD BEST UNDERSTOOD BY THE NATIVES. THESE STATIONS ARE LOCATED IN THE CENTER OF TIMBER TRACTS, AND FROM THEM RADIATE ROADS OR SMALL RAILWAY LINES INTO THE FOREST.



BIG QUEBRACHO LOGS GATHERED IN "THE CHACO."

It should be noticed that these logs have had the bark removed, and are serviceable either for tanning extract or for sleepers. If logs are felled close to a factory, every particle of the wood may be utilized for the extract.

splendid polish. The Argentine railway companies, which now finish a considerable proportion of their really fine ordinary, dining and sleeping cars, have found quebracho to have notable advantages over other woods for both strengthening and decorative purposes. Indeed, a demand for many other kinds of native timber, hitherto scarcely considered for building and cabinet-making, is spreading rapidly. It has been discovered that such are more suited to the climate and other conditions of the country than the foreign woods hitherto imported for these purposes."

If Argentina shall awaken to the necessity of soon protecting her splendid northern forests against the ravages of the money-mad corporations, she will place herself among the progressive nations. As the matter stands today, over \$10,000,000 worth of quebracho, in logs and extract, is being exported—about \$1,000,000 more of timber than of tannin. The logs are used chiefly for railway sleepers, fence posts, paving blocks and fuel, and of late years from

sixty to ninety per cent. of the timber exports have gone to the United Kingdom. Formerly Germany was the largest market for the extract, but the heavy import duties imposed on it have almost barred it from that country. For some years the United States has been getting about fifty per cent. of the tannin, whose exports amounted to 75,000 tons in 1912.

The manufacture of the quebracho tannin is conducted in numerous little factories in the forests of the Chaco region and the adjoining provinces of Santa Fe and Santiago del Estero, and as one ton of extract represents four tons of logs, the freight profits of the railroads are considerably reduced by this transformation. The factories are mostly located in the province of Santa Fe. It is estimated that the annual timber products of these three great forest districts of the north are divided as follows: Santiago, 3,600,000 railway sleepers, 1,800,000 fence posts (chiefly quebracho), and 310,000 tons of quebracho logs; Santa Fe, 490,000 tons of



MODE OF TRANSPORT BETWEEN THE OLDER WAGON AND THE NEWER RAILWAY.
BEFORE THE QUEBRACHO INDUSTRY HAD ASSUMED ITS PRESENT PROPORTIONS IT WAS THOUGHT A VERY PROGRESSIVE STEP TO LAY RAILS FOR TRACTION
BY ANIMALS TO THE EDGE OF THE FOREST.



THE BARK OF THE QUEBRACHO TREE.

The workman always tries the tree, if it is to be used for its tanning extract, by testing the thickness of the bark and sap wood. If the sap wood is too thick ($1\frac{1}{2}$ inches or more), the tree is spared, because it involves too high a labor cost to cut down a tree having proportionately so small a trunk. As neither bark nor sap wood contain much tannin, and, as these coverings are always removed before a log is shipped, it is cheaper to search for trees of greater yield.

logs, and the territory of the Chaco, 45,000 tons of logs.

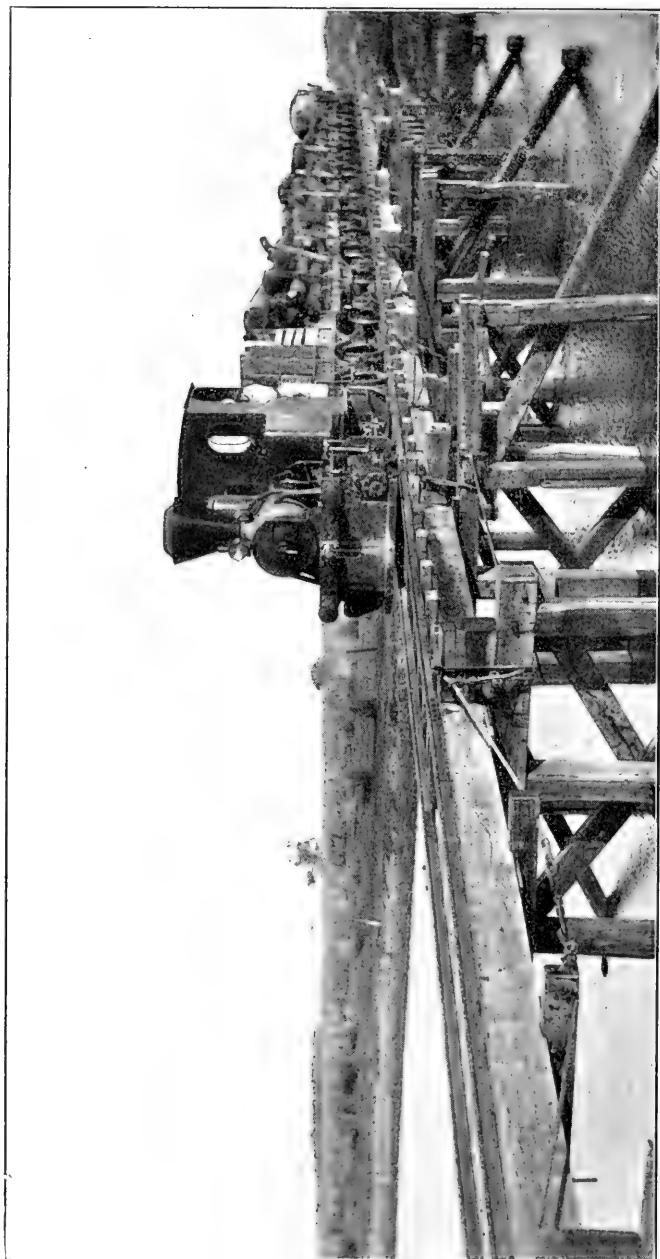
The northernmost forests of Argentina have also extensive belts of *lignum vitae*, or Brazil wood, whose solid and ornamental qualities have been utilized in so many ways. The southern districts of the republic, covering what are often called the Patagonian savannahs, carry oak, cypress and other woods which go into wine casks, furniture and interior woodwork.

But the quebracho forests of the north and northeast remain by far the country's most valued supply of hardwoods, and upon their conservation will rest Argentina's future as a nation which is capable of learning from the experience of others.

Within the past decade the amount of logs exported has increased from 245,000 tons to 445,000, and of extract, from 9,000 to 84,000. In this great land of forests and glades, rising from the Parana river toward the northwest,

some 300 saw mills (*aserraderos*) and extract factories are eating out its vitals, backed by 25,000,000 gold dollars of capital and \$45,000,000 of sales. The largest company employs 4,000 or 5,000 workmen in getting out the timber and transporting it to the saw mills and extract factories.

The greater proportion of the population of the quebracho country are *Correntinos*, a mixed race of the native *Guarani* Indians and the whites of all nations. The Chaco, or more northern part of this forestal district, is a plain inclined toward the southeast and the Parana river, but it is also a land of forests and solemn glades—a sort of Kentucky—a dark and bloody battleground long contested by the Spaniards, the Argentines and the Indians, and large tracts of which are still unexplored and held by primitive owners. The Chaco Indians have been the warriors of their race in Argentina, and the Tobas, still half naked and armed with wooden



A QUEBRACHO TRAIN APPROACHING ITS DESTINATION.
THE TERMINUS OF MANY RAILWAYS IN THE CHACO IS AT RIVER NAVIGATION. HERE THE TRAIN UNLOADS ITS BURDEN INTO OCEAN-GOING VESSELS FOR
SOME DESTINATION OVER SEA.



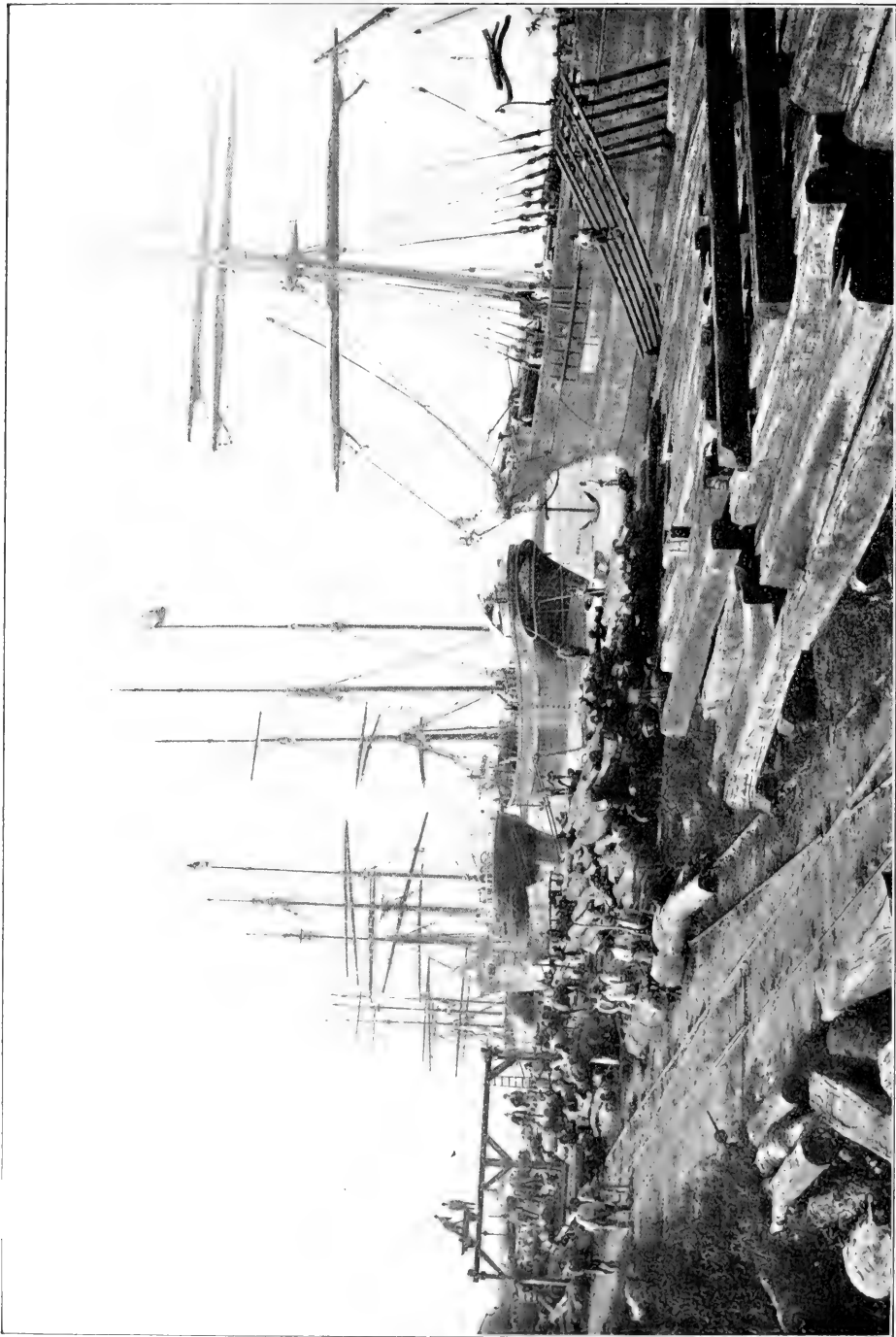
LOADING QUEBRACHO FROM A HIGH RIVER BANK TO AN OCEAN-GOING STEAMER.
On the Paraná River, near Rosario, anchorage is found for steamers of considerable draft, but special apparatus is employed to get the logs on board. They are first lowered to the stream by wire rigging and then hoisted to the deck.

lance and bamboo bow, are responsible for the line of forts which stretch along the northern frontier. Farther away from civilization, their costume consists of a few tufts of ostrich and parrot feathers, or of a white linen head-dress patterned after the ancient helmet of the Peruvian Incas. The stone axe is there in common use, and in many districts fire is still produced by friction. As the fringe of civilization is touched by the Chaco Indians, they add bag loincloths to their feather or linen head-dresses, and those who come down from the wilds to work in the forests or sugar plantations even don the blouse, wide trousers, broad-brimmed hat and flowing colored tie of the Gaucho or Italian peon.

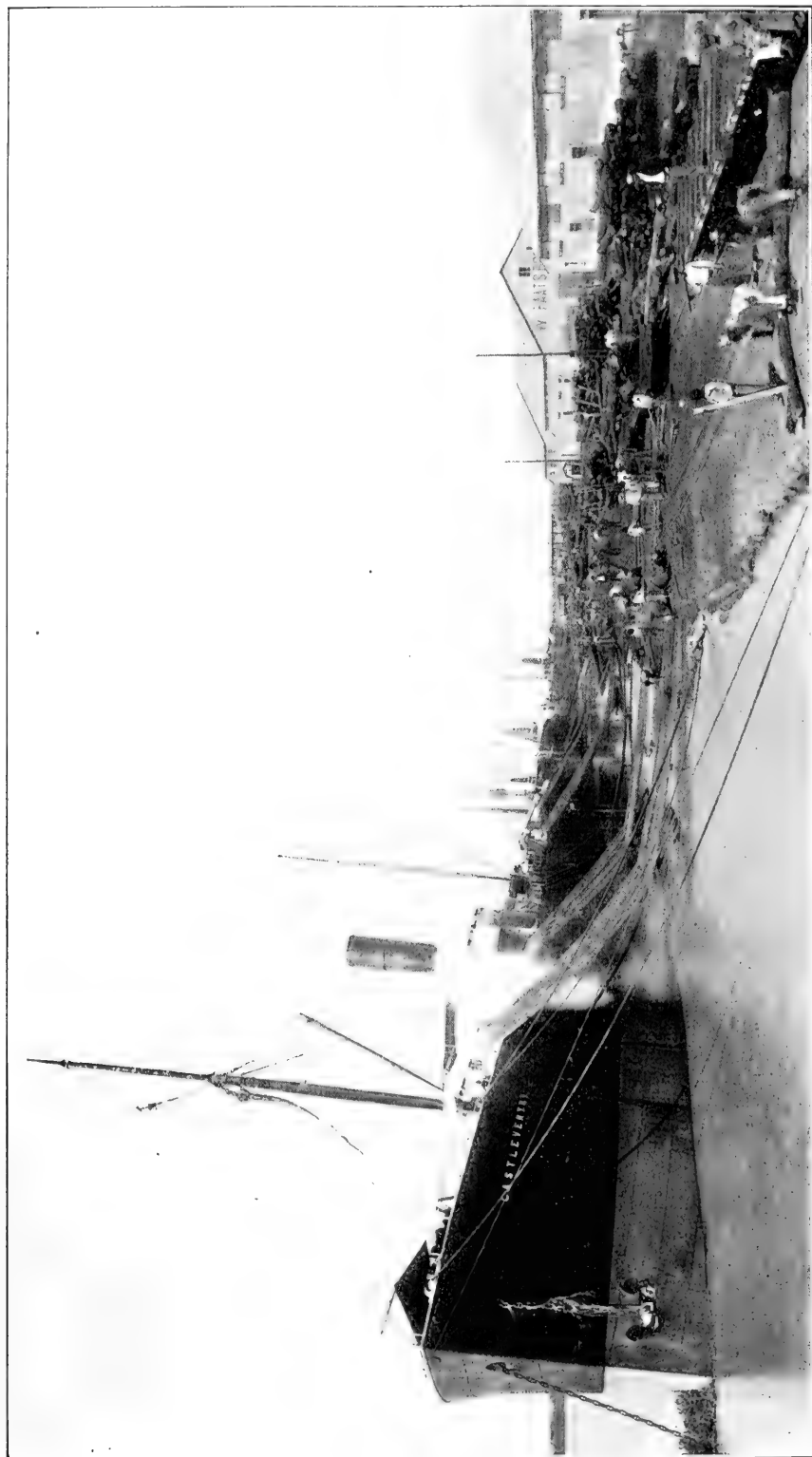
☒ The cultivation of cane and the manufacture of sugar are prosecuted over a large extent of northern and north-western Argentina, and in these industries several thousand Chaco Indians and mixed Correntinos are employed every year as unskilled laborers. Many more work in the quebracho forests.

At the end of the sugar season these savage workmen will return to their homes in the Chaco country, travelling sometimes four or five hundred miles over mountains and through swamps and forests. They will then fell the quebracho trees on the banks of the rivers and streams, bind them into rafts with lighter woods beneath as floating buoys, get out fence posts and sleepers and assist in preparing the red quebracho for the manufacture of the tannin extract. Another hardwood tree which the Indians and semi-Indians help to get into commercial form is the algarrobo. It goes into street paving (as does the quebracho), its beany fruit makes good fodder, and a liquor is distilled from it which is the source of many a fierce headache to the Chaco man and woman.

The management of these hardwood industries is chiefly in the hands and brains of Europeans of Latin and German stock, with a threatened incursion by capitalists of the United States. The Farquhar syndicate, a powerful combi-



LOCAL PORTS FOR QUEBRACHO, TRAFFIC ON THE RIVER PARANA.



QUEBRACHO LOGS GOING TO EUROPE.

FROM SEVERAL POINTS ON THE PARANA RIVER LOADING IS A VERY SIMPLE PERFORMANCE. THE RAILWAY BRINGS THEM TO THE WATERSIDE, AND THE ENGINES ON THE STEAMER HAUL THEM ON BOARD ACROSS SKIDS RESTING AGAINST THE BANKS.

nation of New York moneyed men, is solidly entrenched in Paraguay and southwestern Brazil—another great Chaco, or Indian country—and is making ceaseless attempts to penetrate the quebracho region of Argentina.

With the rapid extension of railroads throughout the forestal regions of this section of southern South America, the most serious drawback to the exploitation of their riches is being removed. When the trees to be felled are away from the water courses, cattle must haul the heavy logs through the dense forests. Both cattle and men require fresh water, or they cannot work.

On the other hand, the land bordering the streams and rivers is generally swampy and subject to overflows, and there are many rapids to be overcome in the best of the water courses. Rafting is therefore especially difficult, and the navigation companies, with their freight steamers and schooners, as well as the few railways in the territory, have taken advantage of the quebracho lumberman and extract manufacturer to charge exorbitant rates for transportation. The extension of trunk lines of railway into the forest area, and the completion of the links which have brought it into touch with Buenos Aires, the seaboard and the world's markets, is so stimulating the industries of the country that the denudation of the timber lands should be, more than ever, a matter of present concern. With the fair protec-

tion of the forests, and consequent conservation of natural supplies of water, many sections of the country could well be devoted to live stock and the cultivation of wheat, cotton, sugar and tobacco. But if the land is completely striped of its forests, and no provision be made for future growths, the coming generation will furnish another hard example of the cruel saddling of unnecessary burdens on the shoulders of unborn sons and daughters of the soil. In the case of the quebracho forests of Argentina, this seems especially hard-hearted, since the natural stock can be replaced in twenty or thirty years—an advantage seldom offered by hardwood as valuable as this.

It might even be suggested that the leather manufacturers of the United States, for the good of their sons and those who follow them in their industrial life, should urge upon the governments of South America in whose domains lie the forests of quebracho, the desirability of the restoration of denuded tracts, knowing, as they do, that the hemlock bark of their own woods has long since proved inadequate for their tannin demands upon it. In our land, the denuded hemlock forests have been largely replaced by other native trees and given over irrevocably to farms, villages and cities. In Argentina and Paraguay, comparatively undeveloped, the problem is simple as well as urgent.

*Photographs in this article by courtesy of the Pan-American Union.

Canada has 23 million acres in timber reserves, as compared with 187 million acres in the national forests of the United States.

Apple wood is the favorite material for ordinary saw handles, and some goes into so-called brier pipes.

New Jersey has a timbered area of about two million acres, on which the timber is worth about \$8,500,000 on the stump. It is mainly valuable for cordwood.

Many of the forest fires attributed to railroads are caused not by sparks from locomotives, but by cigar and cigarette butts thrown from smoking-car windows.

Port Orford cedar of the Pacific coast, recently tried as a substitute for English willow in the manufacture of artificial limbs, has been found unsatisfactory. While it is light enough, it is too coarse and brittle.

As an experiment, the supervisor of the Beaverhead national forest is stripping the bark from the bases of a number of lodgepole pine trees at various periods before they are to be cut for telephone poles. This girdling causes the trees to exude resin, and it is desired to find what effect this may have as a preservative treatment for the poles.

FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER, M. F.

Editor Field and Stream

IV. TREE TROUBLES

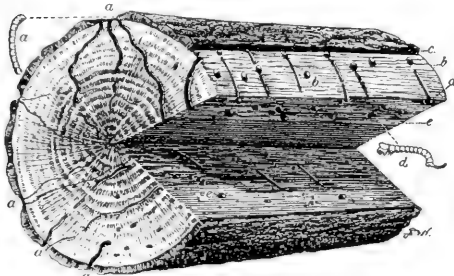
IN THE woodlands of a country estate owner, forestry partakes of many of the characteristics of park culture, as opposed to lumbering, in that the individual tree will have more care bestowed upon it and more money spent to save it if it is ailing than the lumberman could ever afford to spend. To him a tree attacked by borers or caterpillars is just non-merchantable stock, to be left standing or else used for skidways or construction work. To the estate owner, however, his chestnuts, hickories, pines, hemlocks, oaks and maples are the glories of his forest, and he will go to considerable expense to save a fine specimen, knowing well that if it dies he will not live to see it replaced by another like it.

These lines are therefore written more for the man who proposes to keep every fine tree in his forest thriving and healthful, than for the commercial forester who is mainly concerned with exploiting the timber. The usual forest remedy for most insect and fungus epidemics is to cut down and sell at once all the infected trees, also cutting down and leaving trap trees, which are forthwith burnt at the proper time to destroy the insect life they contain. Such a course would at once deprive the man owning a small tract of woodland of a large number of the trees which form a noticeable part of his forest, and which could ill be spared without rendering the place unsightly and leaving many dangerous gaps in the forest cover. For him, then, the spray and tree-surgery methods, in order to save and keep standing the fine growth that he already has.

In general, the best way to reduce tree troubles is to put your forest in a condition of maximum health, with the full complement of bird, animal and insect life which nature had ordained and maintained for thousands of centuries before tree troubles were ever

thought of. With the approach of civilization, the settlement of country, the growth of railroads, the killing off of our song birds, and the introduction of foreign insect life for which our own forest régime had no specific remedy, the tree troubles in our forests multiplied fast, and millions of dollars have been spent in artificial methods of restoring Nature's balance and trying to save our native trees from utter destruction. With the passing of the birds went our great feathered army of tree cleaners; with the introduction of the railroad and the factory came vast clouds of black soot, tainting the air and clogging up the respiration of our tree leaves, so that it is almost impossible to travel along the right of way of any big commuting railroad and see anything but dead and dying trees, killed by the train soot. And then, in the irony of fate, while it has proven impossible to make imported silk worm moths and other valuable insects thrive here, the harmful sorts, such as the gypsy and browntailed moths, increase and multiply here wholesale! To restore the original plan on which Mother Nature got along comfortably enough, the owner will see to it that a big, thriving bird colony is attracted to his forest, by bird houses, feeding, and rigid protection; that the forest is cleaned and thinned so as to promote vigorous growth in his trees; that spraying apparatus is used on infected trees too valuable to be cut down, and that parasites are imported, under directions of the U. S. Bureau of Agriculture, to fight insect epidemics. He will need all these resources to insure a fine forest growth, for, while Nature had a vast amount of decayed wood to contend with, man today has constant invasions from without his premises of every sort of fungus and insect wave which sweeps over the country, which more than balance the advantage gained by having a clean

forest. Insects and fungus will not as a rule attack healthy, living trees, but, when an invasion comes, there is not enough recently killed timber to go around, so that the insects concentrate their attacks on a healthy tree and kill it, with the object of attaining more dead wood to operate in. And, with the leaf-chewing varieties, the healthier the tree is, the better victim it makes.



WORK OF TIMBER WORMS IN OAK.

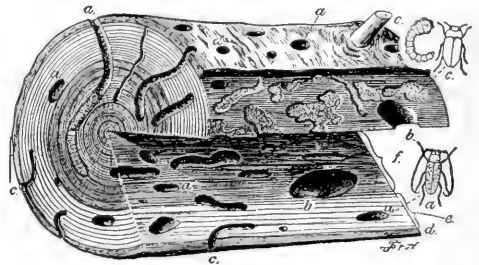
(a) OAK TIMBER WORM; (d) SAP TIMBER WORM.

The part the birds play in keeping down insects is enormous. For instance, take the little green inch-worm which we are wont to regard as a harmless sort of creature, principally engaged in measuring one for a new suit. To the forester he is known by the sinister name of canker worm, for he is the dread foe of all tree life, absolutely voracious in his attacks on all foliage, and denuding a tree of every leaf it has got, if given a chance. Yet one little vireo, nesting nearby, will find and eat hundreds of him in a single day. So will the harmless little garter snake, who performs for the bush life of the forest the same service that the birds do for the tree life. Nature has always kept down our American canker worm species within the limits of furnishing food for birds, with a reasonable amount of leaves supplied for the continuation of the canker worm family, but, with the birds gone, this restriction is removed and there seems to be no limit to the canker worm but the blue sky!

In the same way the woodpecker tribe have always kept the borers within reasonable bounds. All the sap borers work just under the bark, making big galleries through the cambium layer, and cutting all the sap fibres, so that

the sap flows to their precious offspring instead of feeding the tree, and by the time they have girdled a tree completely there is nothing for it but death to the latter—usually two seasons of borers will suffice to kill a perfectly healthy tree that has taken fifty years to reach its present stage of maturity. The woodpeckers, nuthatches, creepers *et al.* used to go over every tree carefully, listening for the borers at work and tapping the bark for hollow spots, and when they left a tree every borer on it had been found and eaten, to say nothing of a few million cocoons and dormant insects under the crevices in the bark. Nowadays, with one woodpecker to a hundred acres of forest, man has to do the principal fighting, and his only remedy is to cut down the tree or else make a woodpecker of himself and go over the infected tree with an oil can and a hatchet, squirting kerosene oil into the borer galleries under the bark. One remedy is worse than the disease, except that it may save the remaining trees, and the other is pretty expensive, but worth trying in the case of a fine, large tree, which used to send down a bushel of hickory nuts every season.

Do not get the idea from the above

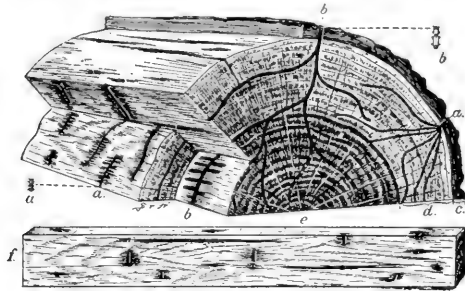


WORK OF PINE BORERS.

(a) ROUNDHEADED BORER, (c) FLATHEADED BORER, LARVAE AND ADULT BEETLE.

that all our forests are necessarily going to the bow-wows; far from it. Unless you are located near large cities or along heavily travelled railroads, the bulk of your forest will be healthy if properly managed. In the forest of Interlaken, where the writer lives, we have about three hundred acres of woodland, mostly white oaks, red maples, sweet and sour gums, chestnut oaks and some pine,

chestnut and hickory. We did not have the blight, nor have we had any special insect epidemics, and we have more than our share of birds, for there seem to be as many here every summer as there used to be twenty years ago in the suburban towns much nearer New York than we are. Every Appalachian species is well represented, and one can hear the quail whistling in the woods



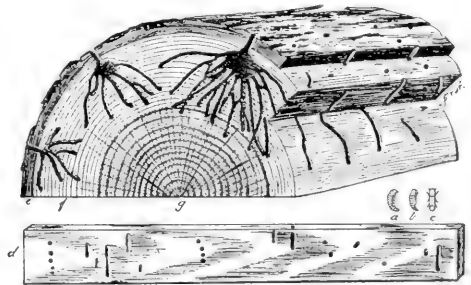
AMBROSIA BEETLES IN OAK.

(a) *MONARTHUS* MALE AND HIS WORK; (b) *PLATYPUS COMPOSITUS* AND GALLERIES.

any summer morning, before the day noises have begun to drown out all the sweet, quiet woods sounds.

But insect, fungus, fire and light problems will occur, and are continually coming up in any forest estate, and the only way to avoid suffering from them is to have the equipment and fight them vigorously until you have the mastery. Beginning with the first two, anything that chews leaves can be combated with a poison spray, of which arsenate of lead is the best, as it sticks to the foliage in spite of showers that would wash off Paris Green. For forest work, where there is no lumbering or logging road, nor fire lane down which a barrel spray wagon can be moved, the knapsack or bucket spray apparatus will answer. The cost runs from five to fifteen dollars, and a large barrel spray pump, with barrel and agitator attachment, will cost thirteen dollars. The standard solution will make fifty gallons of spray to the gallon of chemical, and the latter is all that need be carried, replenishing the water supply at the nearest brook. All sort of nozzle lengthening attachments, in the form of light pipes with a nozzle at one end and a hose connection at the other, for treat-

ing tall trees, can be had, as can also all the standard spray chemicals, all made up and only needing the addition of water, at any of the big seed houses. Several special nozzles for various types of spraying should also be provided, since such sprays as Bordeaux mixture require occasional degorging. Certain caterpillars of the European species our native birds will not touch, and for these spraying is the only remedy (but it is effective), and for all the fungus diseases the Bordeaux mixture spray is essential. For scales and lice the whale oil and kerosene emulsion sprays will be needed, such as for the April spraying of your silver maples for cottony maple scale, and oyster shell scale on poplars and hard maples. Bordeaux mixture is the best remedy yet discovered for blight on chestnuts, slime flux on all large gaping wounds in the cambium layer of any tree, and anthracnose in sycamores and oaks. In these latter trees the affected twigs had better be pruned off and burnt in the early spring, which brings us to another much-needed tool, the pruning hook and tree saw, both of



AMBROSIA BEETLES IN HICKORY.

a, b, and c, Hickory borer, larvae, pupa and adult. The remedy is to cut off and burn dead all infected branches and inject kerosene oil into the galleries on the tree trunk.

which come with twelve foot or longer handles for forest tree work, the cost being about a dollar for each tool, or they can be bought combined in one tool for \$1.75. A couple of good extension ladders will also be needed, the thirty-foot size, costing around twelve dollars, being ample for nearly all forest work. In the fall there will be some cocoon cleaning to do, and the implement for



WINDTHROWN FIRS IN THE SHILWALD, ZURICH.

this is a wire tree brush, costing two dollars, which is attached to a long pole and manipulated from ground or extension ladder, depending upon the height of the tree infested with the little white cocoons, which will mean so much trouble for you the following spring if not brushed off and burnt.

Another weapon to fight forest enemies is the tar band. Many species, such as the canker worm and the elm leaf beetle have a continuous cycle of reproduction going on all summer, and a colony of them will camp out on a tree and ravage it of all its leaves if not headed off. After losing its first crop the poor tree tries to put out another, and usually does, but by the time they are grown a new generation of caterpillars will be on hand and this crop goes also. Another crop of leaves will sometimes put forth in September, but usually the tree is through for the year, and if the experience is repeated the next year, the tree dies from suffocation, for the leaves are what it breathes with. Spraying is, of course, one remedy; and the other is to prevent the ascent of the female moth full of eggs. Luckily she cannot fly in this state but must

crawl up the trunk to the branches, in the crevices of which she deposits her eggs. With plenty of birds about, these are cheerfully eaten and there's an end; but nowadays most of them hatch, and the voracious little larvae begin right off on the tender spring foliage. In two weeks they are full grown and let themselves down to the ground by spinning a long silk thread, which you have often seen them do, many of them being carried by the wind to infest other trees. After burying themselves in the ground they enter the pupa state, some species remaining dormant until next spring, some emerging as a moth in a month or so, when they immediately crawl up the tree again and start a new colony of worms. Most seed houses keep sticky band preparations already prepared, so that the forest estate owner with only a small patch of woodland need not bother with tar preparation on a large scale. I have seen forests in Germany where for miles every tree was banded, all along the borders and into the forest about fifty or a hundred feet, the idea being to keep out these crawlers by catching them on the border trees. These bands should

go on during the first warm days of early spring. Any tree attacked by canker worms, elm beetles, pine and spruce beetles; gypsy, browntail and tussock moths, and ants, should be so banded.

One more mechanical weapon, the tree torch, for tent caterpillars and cocoons. The iron basket with asbestos filler costs twenty-five cents and can be attached to any sort of pole cut in the forest. Saturate with kerosene oil and pass quickly along twigs and branches where there are cocoons or webs of the tent caterpillar. A heat of 140 degrees Fahrenheit reached in the cambium layer of any twig or green branch will ruin it, but, as the specific heat of sap is nearly as large as that of water, the flame can hover for nearly a minute if need be in any one locality without raising the sap temperature to that point. Bark injury, with its attendant fungus troubles, is more to be guarded against in the use of the torch than sap injury, and on thin bark, as a rule, ten seconds of flame will kill any pupa or burn up the cocoon, and is long enough for the torch to remain.

Lichens, mushrooms, toadstools and fungi will attack any dead or decaying tree, and any exposed wood or wound on a live one. As soon as the fungus has effected a lodgement, the mycelium or, as it were, root fibres of the fungus, fight their way down into the wood, rotting it as they go, and what was at first a minor injury soon becomes a bad wound. The remedy for all this is clean cutting the wound, disinfecting with one of the standard formaldehyde solutions sold at any seed store, and painting with tar or white lead paint, the latter of course being colorable to any shade desired, as in house painting. The living part of the tree is the sap layer only; one should get to regard the heart wood as a carpentered structure and treat it accordingly. How would you go about stopping rot in your house trim, your barn timbers or your fence posts? By cutting down to fresh wood and repainting, of course—and that is really all there is to tree surgery. Be sure and go deep enough to get out all infected wood, or you might

as well not start at all, and if the resulting work will leave a rain pocket, fill with Portland cement mortar, two parts sand to one cement, and cap it off with neat cement or one-and-one mixture. In a big forest much of this sort of work is entirely unnecessary, for nature is doing it very well herself. All the shade-killed branches are self-pruned by the fact that the rot begins



COTTONWOODS INFECTED WITH BORERS.

right close to the trunk, and the wind soon breaks off the dead branch. Year by year the cambium layer closes over on the decayed stub, until finally the closure is complete. After that the sap layer flows completely over the spot, and we get the well-known bark knob, so common on maple, elm, dogwood, cherry and gum trees. With large limbs, however, which from one cause or another have been shade-killed and later break off, the fungus attack is likely to get a firm foothold, and as the closure cannot be made by the bark growth on account of the size of the hole,

the rot continues from year to year until the whole heart wood may be rotted. In such cases the tree surgeon gets to work and saves the tree for many years of usefulness and vigor, for, while a tree rotten at the heart will be as healthy and vigorous as ever in its growth, it is mechanically weak, subject to insect and fungus attack and likely to be windthrown any time.

Fire is an enemy that will not bother the owner of a hardwood forest to any great extent, except in the matter of ground and brush fires, but as soon as he plants or assembles a forest of evergreens he is in danger of fatal crown fires from almost the first year. During the early years of a plantation the danger is of a brush or field fire, which of course would kill the young transplants; and after the sixth year the crowns get to such a size as to easily communicate a fire even on six foot spacing. Fire and logging lanes should be left every four hundred feet in such a forest, and these should be twenty-five or thirty feet wide during the first twenty years of the life of the forest, and later widened to 50 and 100 feet. In planting for a twenty-five-foot fire lane, leave forty-five feet between the border transplants to allow for side growth into the lane from both sides, or branches, which will easily attain ten feet in length in the first fifteen years. A fifty-foot European larch border around each section is a good thing, not only because it is the best way to grow such an intolerant tree as larch, but because it aids materially in the effectiveness of a fire lane in a forest of spruce or pine, the larches being less vulnerable to crown fires.

In the hardwood woodlot the fire most often met with is the ordinary leaf or brush fire. These seem harmless enough, and might even be suggested as a means of cleaning out underbrush cheaply, but as a matter of fact they are extremely harmful. At first nothing unusual is apparent but some blackened bark at the stumps of the trees. If the bark is thick and the tree old, no particular harm has been done, but the saplings of three to six inches diameter of all species will have been found to be

badly scalded. In a year or so the bark spalls off, showing bare heart wood underneath; the tree has only about half the original number of sap fibres available to feed it and therefore cannot circulate its sap from roots to crown freely, and soon becomes peaked and diseased. In time it may heal up the scar, grow bark over it and put down some roots on this side again; more often a set of coppice shoots will start from the root collet, and instead of one tree you have a spindly sapling and a lot of outlaw shoots, which fight with it for light and moisture. We have one patch of forest in Interlaken, burnt over by one of these "harmless" ground fires, in which every single sapling shows a scar as big as a saucer, and on the big trees some of them exhibit a scald the size of a dinner plate. They will all be taken out in time; at present we have planted some three-inch nursery white ashes and liriodendrons here and there in the patch, which will be the dominant trees in a few years, and then the burnt growth will be taken out entirely as none of it will ever make good, sound trees. Wherefore, prohibit brush fires in your woodlands, and be keen to put out any accidental ones. Very good apparatus for the purpose, consisting of asbestos fire shields, pack-sack fire extinguishers, etc., are now being made commercially so there is no necessity to go to the trouble of home-made equipment. I have already published what can be done with dynamite in fire fighting, and would advise reserving a set of tree-planting cartridges, all wired up for use in emergency brush fires, as they often occur when sufficient help cannot be gotten to the scene of the brush fire quickly enough to save many valuable saplings. I knew one leaf fire that covered half an acre of ground in ten minutes.

The problem of light in the forest is a fascinating one, and any forest owner can get a good deal of pleasure out of the study, using an ordinary photographic actinometer to make his own measurements. My good friend, Raphael Zon, of the U. S. Forest Service, has published an excellent bulletin on the subject, which everyone should read to

get posted in the matter (Bulletin 92, Forest Service). His measurements are all in Weisner's "Isolator" standards, but a good enough practical substitute can be made by measuring full daylight in your locality on bright summer days with the photographer's actinometer, and then taking the average per cent. of full daylight with this instrument in any locality you propose to under plant. A table of our more common eastern species, with their tolerance expressed in terms of full daylight, would be valuable. The subject is of importance, for many species will thrive when young in a light which they would die in after middle age, and it is well to take light values in different localities before finally deciding on the species of tree to plant there, after due consideration has been had of water, soil, and surrounding general conditions. With us

in Southern Jersey, the light intensity problem is not so very serious, for the general diffused daylight is so strong that white pine will grow directly under a big chestnut oak and seemingly get to maturity without any particular trouble—we have several of them 35 years and over growing under such conditions. But in more northern localities, where the winters are severe and the total yearly daylight much less, light measurements should be taken. In the brief limits of this article the subject can be barely mentioned; I believe that with a thorough comprehension of all that is said in Zon's bulletin, a woodlot owner could make with an ordinary pocket actinometer, costing fifty cents, measurements sufficiently accurate enough for planting purposes.

(To be Continued.)

A MAN TO A TREE

By GERTRUDE CORNWELL HOPKINS

Stripped clean to meet the blast you
stand,
No tender leaves to shred;
Your thousand fingers grip the earth
And all the rest seems dead.

Your life drawn back and hid beneath
The cool, thick, silent crust—
No blithe joys now of upper air,
Your spirit dwells in dust.

I'm like you, Tree; this is the time
I'm stript to bare life's needs,
For when a branch is full o' sap,
And bent or broke—it bleeds.

I have to see some grim days past,
To play this game straight through;
It's time for endurance, not for mirth
With me, the same as you.

But I'm not set to stay like this,
So stiff and stark and numb:
A man should be as sure as you;
His good green time will come

When he can spread in the warm air,
Stick small, new leaflets out,
And add a grace or two to life—
He doesn't have to doubt.

Yet—I need more than you do, Tree;
I can't stand still and wait,
Secure that all the good that's mine
Will come to me like fate:

I have to stir around a bit,
Find what belongs to me—
O, I'm gnarled and roughed and
strained and hard
But—just you wait, Old Tree!

Lumbermen and others have shown recently that only 40% of the trees cut in the forests of this country are used for lumber. The remaining 60% represents pure waste as high stumps and tops either left to rot in the woods or as slabs consumed in the burner or slash piles at the mill. In Germany about 95% of every tree grown in the forests is used. Practically nothing from the forest is allowed to go to waste; even the stumps are grubbed out and the twigs and branches tied up into faggots for fuel.

ONE VIEW OF THE FOREST RANGER

By PAUL G. REDINGTON

Forest Supervisor, Sierra National Forest

ALREADY much has been written about the forest ranger—some good poetry—more bad; some true-to-life fiction, more that widely misses the mark. To those people who have never come in contact with the forest ranger—easterners and those of the west who do not frequent his habitat—his life is one of romance, adventure, danger. To them he is a mighty man of brawn, clad in the stage habilaments of a frontiersman or cowboy, superbly mounted, travelling in a country where heretofore “the hand of man has never set foot;” classes in the same category as a member of the Northwest Mounted Police of Canada; an officer of a great government, clothed with the stern and unyielding authority of the law as he does his business with the grazer, the miner, the lumberman and the settler. This poorly drawn picture of a forest ranger has been displayed before the eyes of many people by noted authors and writers of fiction and one cannot blame the uninitiated if he fails utterly to comprehend that commonplace and hard, grinding work also are to be found in the daily life of a ranger; that this government officer seldom has to resort to force to carry out the law under which he works; that he is the friend and not the enemy of the men with whom he transacts business; that he is a respected member of a community; in most cases a man with a family, with the cares in this respect of the average American citizen on his shoulders; that he does his work from a sense of duty and because he wants to see it well done rather than because of arbitrary instructions of a superior officer. These people fail to appreciate—because they do not know—that a large part of the work of the ranger is of his own initiating; that within certain limits he plans the greater part of the work which is to keep him busy, unhampered by dictation from any

higher authority. There will always be romance in the ranger's life, and it is safe to say that his work and his life will furnish the basis for many of the really readable novels of the future. I have often thought of what a chance any man in the field force of the Service, blessed with the knack of throwing together a good novel, has of putting the forest ranger into a story that would deal with the romantic and the humdrum, the humorous and the pathetic; a story that would give to the public a clearer idea of the real work of the average ranger than has been conveyed in the writings hitherto. How many little anecdotes each one of us knows, which, if put into properly embellished English, would make one of the most interesting groups of short stories in existence. But I am going to sidetrack this phase of a many-sided subject, and try to tell just what I think of the forest ranger and his future as viewed from a few short but pleasant years of contact with him and from the angle of a good many different positions.

The forest ranger is, though he may not fully appreciate it, the foundation of the Forest Service, on which the vast establishment absolutely depends for support. He is the real forester in this great government machine. If not, in technical parlance, now, he will be not many years in the future. The practice of the profession of forestry must naturally be based on, first, a chance for the largest possible amount of field work, and, second, on observation; assuming, of course, that the man practising it has had sufficient of the theory of forestry to allow him to do proper and accurate work in the woods. As I say, the work must be done in the field where results can be watched for and studied. This cannot be done by an administrative officer of the Service, who necessarily has to devote a great bulk of his time to office work in connection with proper



RANGERS SURVEYING FOREST HOMESTEAD TRACT, SIERRA NATIONAL FOREST.

THESE MEN ARE RUNNING THE BOUNDARIES OF A QUARTER SECTION WHICH IS TO BE OCCUPIED BY A HOMESTEADER. THIS LAND HAS BEEN ELIMINATED FROM THE FOREST RESERVE AFTER OFFICIALS OF THE SERVICE HAVE DETERMINED IT IS BETTER FITTED FOR AGRICULTURE THAN FOR FOREST GROWTH.

organization, and also because such an administrative officer, even though in the field for quite a portion of his time, has generally a large territory to cover, and his work cannot be intensive. It now happens that the greater number of the higher administrative offices in the Service are filled by men who have had, considering the chances in this country, a good technical education, but this is no criterion by which the future should be judged. These men of whom I speak may be classed as the missionaries of the forestry profession in the United States. Their work has been one of education and of organization and the work they have done in the past five years along these lines will, I think, always stand out as a distinct and a remarkable achievement; but these results could not have been as successful as they assuredly have been unless these missionaries had found men willing to be educated in the fundamentals of forestry and also willing to sacrifice a larger gain for the satisfaction of accomplishing something for the general public service. The rangers constitute this latter class of men to whom I refer, and it would be difficult to frame a tribute which would convey the credit due these men. They have worked under exasperating difficulties, and they do not, in most instances, appreciate what they have accomplished.

More and more it becomes apparent to me that to the man who wants to accomplish those things which are going to count in the organization and management of forest work, a position in the field is an absolute necessity. There will be no denial of my statement that the trend now is out of the office and into the woods, but some of the men who are taking this step now are a long way behind the rangers who have been in the woods for some time. As Inspector and later Associate District Forester in another district of the Service, I thought very often with envy of the Supervisor, since from that point of view it seemed to me that he was the man who was accomplishing things. Now, as Supervisor, the same feeling comes to me when I think about the rangers. As Supervisor, perhaps my judgment in

differing with a ranger on a piece of work must as a matter of organization be final, but unless I have been on the ground and know the conditions thoroughly, I never feel satisfied with the decision that has to reverse a ranger. To successfully conduct the work of a national forest, the Supervisor must depend almost to the last degree on his men in the field, for they are the men who are on the firing line and who are doing things.

Not many years from now our ranger districts, smaller in area considerably, will be in the charge of a forest ranger, who to successfully conduct the work within his district, is going to need a fundamental knowledge of technical forestry. The forest stations will be equipped with tree nurseries whence a supply of young trees can be transported quickly and safely to an area in need of trees, when natural reproduction has failed to seed up a logged or burned country; these stations will be equipped in many instances with instruments for recording all those climatic features that have such an influence on the growth of the forest trees. The stations will be dotted with experimental plots from which the technically educated ranger in charge will draw his conclusions on which to base his field work. This change I think the men have all seen coming, slowly perhaps but surely, but I do not believe any of them, who think they lack opportunities for obtaining knowledge for technical forestry, should become alarmed lest their positions are shortly going to be preempted by others. The rangers do not appreciate that they know a great deal about technical forestry, neither do they, I think, realize how tremendous an opportunity each one of them has to widely extend this knowledge of technical forestry by study, by reading, and, perhaps most important of all, by observation. Though it is hard for some to read and assimilate readily, it is possible for everyone, whether the opportunity of a higher education has been his or not, to benefit an hundred-fold by observation. Rangers are seeing those things in the woods that are necessary to the forester if he is going



FOREST RANGER REPAIRING A TELEPHONE LINE, SIERRA NATIONAL FOREST.

THIS LINE CONSISTS OF FIRE LOOKOUT STATION WITH THE RANGERS' HEADQUARTERS AND AN IMPORTANT PART OF THE RANGERS' WORK IS THE BUILDING AND MAINTAINING OF THESE LINES THROUGH THE FORESTS.

to endeavor to satisfactorily solve the forest problems to be found in this country. They have the best chance to study by observation the effects of fire on soil and reproduction. It is up to them to tell us how our methods of fire protection can be bettered; how we can bring about economy in the management of timber sales; how brush burning can best be done and why; what steps are necessary to bring about a better condition of the range. If the rangers can only appreciate it and keep the realization before them constantly, every one of the men has it within his power to advance to an appreciable degree the work to which he is devoting his time and thought. As a field man, a ranger has considerable advantage over the men who have been coached in theoretical methods of forestry at the school, where field work does not occupy a period proportionate with text books. It is up to the ranger to try his very best to get the theory to go along with the practice and experience that is his. The chances for obtaining a forestry education are so much better for the average man now than they were five years ago that we can scarcely prophesy what is going to happen in the next decade, while most of the men are still in the prime of life and able to take (partially at least) advantage of such opportunities. As I have said, most of the rangers have the fundamental principles of the field end of practical forestry well in hand. If those who have not had the opportunity before, can round this out by a short, comprehensive course in technical forestry, one of these days they can return to their districts secure in the knowledge that they are in the position to do the most valuable kind of work for the profession.

As time goes on, our substantial cabins will have been built, our telephone and trail systems completed; our grazing so adjusted as to run almost automatically each year; our current timber sale work well in hand, and then more time will be devoted by the rangers to the thousand and one forest

problems that the American forester has to solve. They will tell us how best we can check the erosion of our mountain parks; what grasses are going to best restore a depleted range; what body of timber needs to be marketed, and all the facts about how much can be cut each year; how much of the area should be reforested as it is cut; how much can be cut fifty years in the future; under what regulations the cutting should be done; what by-products can be obtained from the heretofore wasted portions of trees, and how are incipient insect attacks to be combated. They will be able to say whether or not our methods of forest mensuration are archaic, and just how they can be improved. They will be in charge of reconnaissance crews and will construct a working plan to the last detail for the territory within their districts. I am, of course, speaking for myself when I forecast this future. I know that the majority of experienced men in the Service agree in general with my views. I know that they will tell the men, as I have tried to, if government control of the forests of the western country is to continue, that there can be no great success or large accomplishment unless there is always at the front the forest ranger, conscientious, self-sacrificing, observing, doing things as the forest ranger of today is doing things.

He must remember, when the work drags and discouragements come, that without him and men like him, the Forest Service could not progress. His reward may not come in large remuneration or rapid advancement in rank, or in results actually seen by him, but it will most surely and quickly come in his own realization that he is a cognate part of a movement that touches the very foundations of human prosperity; of a movement that is altruistic, and one that has no tolerance for graft or meanness or selfishness, individual or corporate; his reward will come when he fully appreciates that he has done his best to help along the conservation movement, classed by many as the greatest of modern times.

PROGRESS IN BRITISH COLUMBIA

By OVERTON WESTFELDT PRICE

B RITISH Columbia has already travelled, surely and very rapidly, far along the road which leads to forest conservation. That is important, since in British Columbia's forests is estimated to be over one-half the total timber stand of all Canada.

To what is British Columbia's progress in forestry due? To these three things as I see it. First, a very remarkable opportunity to make the provincial forests serve the provincial welfare; for while British Columbia possesses large agricultural and rich mineral resources, vast water powers and great fisheries, it is primarily a forest country. Second, after opportunity comes the man in William R. Ross, the Provincial Minister of Lands, who, with the strong support of the Premier, Sir Richard McBride, is carrying forward wisely and vigorously a remarkably progressive, clean-cut policy of land, forest and water conservation. Third in the list of predisposing causes for forestry in British Columbia, and also an absolutely essential one, comes a group of men like H. R. MacMillan, M. A. Grainger, R. E. Benedict and J. H. Lafon; men who have great zeal and great efficiency in forest work, and who are building up a forest branch which is like themselves.

This new forest branch is a distinctly vigorous infant. The toys with which it is playing happily and usefully are the forests of British Columbia. That makes quite an extensive puzzle picture, for British Columbia's forests cover one hundred and fifty million acres. This infant organization spent last year about \$350,000 and took in from rentals on timber held by lumbermen under lease from the government, "royalties" which means payments for stumpage, and from miscellaneous sources, about \$3,000,000, or a revenue of \$6.93 per capita for the entire population of the province.

Nor is this somewhat precocious youngster interested merely in present returns. It also goes in quite extensively

for forest fire protection and last year held, with a force of 320 men, the total forest fire damage in the entire province down to \$18,354, which, to put it mildly, is distinctly creditable to those 320 men. During the year also the forest branch completed its organization of twelve forest districts, each with a district forester in charge. It made an admirable beginning on logging inspection of 794 operations whose product aggregated one and one-third billion feet board measure, as well as great quantities of shingle bolts, piling, posts, mine props and poles. It made a notable beginning too, on permanent forest improvements, in the construction of nearly twelve hundred miles of trail and 360 miles of telephone line. To complete the tale merely of its more notable achievements, the forest branch has also developed a thriving little timber sale business, which last year comprised \$238,000 worth of timber sold, and a further \$147,000 worth advertised for sale. When the fact is recalled that the forest branch is not yet three years old, this progress is notable in forest history anywhere.

The next task before the branch is to put forestry into effect on all timber limits with fairness to the forests and to the lumbermen. That, as Mr. Ross, the Minister of Lands, announced in a recent speech, is the most important task of all; and he and his forest branch are facing it.

The recent act introduced by Mr. Ross for the adjustment of timber royalties is a great accomplishment. Without going into detail (for the act is available from the forest branch to any one who asks for it), I want merely to indicate what it accomplishes in fundamentals.

This act provides that royalties, now fifty cents, shall go up by fifty per cent on January 1, 1915, and there remain for five years. Then, in 1920, comes a readjustment, under which the government first determines the average mill



WHERE FOREST FIRES HAVE NOT RUN IN BRITISH COLUMBIA.



ON THE NAAS RIVER, IN NORTHERN BRITISH COLUMBIA.



AN INCIDENT OF FOREST RECONNAISSANCE IN BRITISH COLUMBIA.



BRITISH COLUMBIA HAS UNNUMBERED LAKES LIKE THIS.

run price of lumber for the last three years, and adds to the royalty for the next five-year period one-fourth of the excess above \$18.00 per thousand feet. At the end of every five years for six five-year periods the same process is renewed, the percentage of the price increment above a price of \$18.00 taken by the government in royalty rising gradually from twenty-five to forty per cent.

This means straight profit sharing between the public and the lumbermen. In revenue it means from forestry several times the present returns before the period of the act is ended. As a precedent it means to British Columbia true conservation, if the precedent be followed, as I firmly believe it will. It is precisely one of the great conservation principles for which Gifford Pinchot has been fighting and has been winning and goes on doing both, in the United States; and it is very gratifying to Americans that in his speech endorsing the Royalty Bill of Mr. Ross, the Premier referred to Gifford Pinchot as "that great conservation leader who possesses the rare combination of vision, leadership and common sense." The application of that principle to the other vast resources of British Columbia, such as water powers and minerals, will

make it, more nearly than any other government of which I know, the epitome of conservation principles, with the possible exception of Australia.

I do not mean, of course, to imply that the situation is absolutely roseate. Conservation confronts difficulties in British Columbia as it does elsewhere. But there is in that province an admirable combination of opportunity—for British Columbia owns nearly all the natural resources of British Columbia and the special interests do not—and of patriotic, farsighted men like Sir Richard McBride, Mr. Ross and Mr. Bowser, the Attorney General, in position of high trust. Such a combination is sure to get great results.

The way in which the United States Forest Service has, by friendly cooperation, lent its help to the new forest branch, is an exceedingly praiseworthy and productive thing. The forest branch cannot be a replica of the Forest Service, because it deals with different conditions under different laws; but the purpose of both organizations is to get the highest good for the greatest number from publicly owned forest resources, and there is and is always bound to be a constant and fruitful spirit of mutual help between them. That spirit is already active and at work.

CONFERENCE ON IRRIGATION

SECRETARY LANE has called a conference on the general subject of the irrigation of the arid West to meet in Denver on the 9th of April, and has requested the governors of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington, and Wyoming, to send to this conference those who are interested in the further extension of irrigation in the West. This conference will be devoted especially to the consideration of

methods of cooperation between the States and the Federal Government, the building and managing of irrigation projects and in considering the ways and means of financing such work. Secretary Lane will be represented by several members of his staff, including those most familiar with irrigation matters, and invitations have also been extended to the representatives of financial interests interested in the flotation of irrigation bonds and to the representatives of Carey Act projects.

DEDICATION OF A FORESTRY BUILDING

THE dedication of the forestry building of the New York State College of Agriculture at Cornell University on May 15 promises to be an occasion of great interest. The address of dedication is to be given by L. H. Bailey, former director of the College of Agriculture, at the opening of the program. Morning, afternoon and evening sessions have been arranged.

In the morning and afternoon the following additional speakers will be heard: J. S. Whipple, President of the New York State Forestry Association; C. M. Dow, Chairman of the Forestry Committee of the New York State Bankers' Association; F. L. Moore, President of the Empire State Forest Products Association; C. L. Pack, President of the National Conservation Congress; H. S. Drinker, President of the American Forestry Association; J. W. Toumey, Director of the Yale Forest School.

The evening session will be held in the assembly hall of the Main Agricultural Building, at which Henry S. Graves and Gifford Pinchot will be the speakers.

On Saturday morning, May 16, the Society of American Foresters will hold a meeting at which Alfred Gaskill, State Forester of New Jersey, Filibert Roth, Director of the Department of Forestry at the University of Michigan, and B. E. Fernow, President of the Society, will speak.

The directors of the American Forestry Association will also attend during the two days' exercises and at the same time will hold their spring meeting.

The program throughout follows one main topic, of interest to all, "The Lines

of Principal Effort in American Forestry for the Next Decade." The speakers will develop this subject from various standpoints, including the training of foresters, lumbering, making public opinion effective, national forest work, the national movement for forest conservation, state forestry in the east and in the middle west. †

The Cornell Forestry Club has planned an excursion by boat to Taughannock Falls on Saturday afternoon and an informal dinner there.

Between the sessions of the dedication meeting, visitors will have an opportunity to visit buildings of the university and to inspect the new forestry building.

This building is located on the east side of the university campus, opposite Beebe Lake and Fall Creek Road. Its cost, including equipment, is \$120,000, which was appropriated by the State. It is one hundred and forty-two feet long and fifty-four feet wide. The distribution of principal rooms is as follows:

Ground floor: Wood technology laboratories, timber testing laboratory, locker room, freight room.

First floor: Offices, reading room, lecture and class room, mensuration and utilization laboratory.

Second floor: Silvicultural and dendrology laboratory, museum, herbarium, class rooms, draughting room.

Third floor: Laboratories for advanced students, forestry club room, camera and dark rooms.

Much interest has been shown in the dedication and a large attendance both from within and without the State is assured.

Sawdust is now becoming of sufficient value to ship it to points where it can be used for ice packing, stable bedding, stuffing for upholstery, packing glassware, for shipment of metals, crockery, etc. Sawdust is even used for the manufacture of gunpowder and in Europe it is compressed into briquettes and sold for fuel. A few plants have already been organized in this country for utilizing sawdust for briquettes. Slabs, edgings and tops are now being profitably converted into cooperage stock, broom and other handles, wood turnery, wooden dishes and novelties, dowels, furniture rounds, etc.

The stringent requirement of the Forest Service that all sheep be dipped before entering the national forests has practically eradicated scabies on those areas.



FORESTRY BUILDING OF THE NEW YORK STATE COLLEGE OF AGRICULTURE AT CORNELL UNIVERSITY, ITHACA, N. Y., TO BE DEDICATED ON MAY 15.

A NEW TYPE OF FIRE LINE

By M. A. BENEDICT

Deputy Supervisor, Sierra National Forest

A TIMBER famine in the next generation or two is a strong probability. The rapid depletion of the timber stand on private holdings is a clear prognosis of the grave situation which will confront this country a few decades hence. To partially meet the demands of the future, millions of acres of public land were set aside some years ago as National Forests, to be devoted primarily to the protection of mature timber and the young growing stock which furnish the basis of the future crops. Fire is the greatest menace to this growing stock.

The Forest Service has been paying particular attention to this phase of forest protection for several years, and each year sees the methods of protection brought to a higher state of effectiveness. In fact, the point has almost been reached when the American people—the owners of these vast timberlands—can be assured that the great bulk of the growing stock on the National Forests will be in good shape for harvest at the proper time. There are, however, several obstacles that still stand in the way of complete insurance of the freedom from serious damage to timber from fire. The chief of these in many parts of California is the proximity to the timber producing lands, of large areas of brush lands, which are not potentially valuable for timber production. Immense tracts of this type of land are either included within the forest in order to conserve the water supply, or lie just without the boundaries, where, because of their high degree of inflammability, they are a constant menace to the timber producing areas. The average fire, starting in this type of country, is only controlled through vigilant effort and the expenditure of much money.

The line between the brush and the timber producing areas, on the west slope of the Sierra Nevadas, is generally

a most clearly defined one, and in order to reduce the chance of serious damage to the timber, the idea of placing a cleared line between the two types was conceived in the fall of 1913, and this line was constructed along the proposed new western boundary of the Sierra National Forest (which coincides closely



PELLING A SNAG BY A SAW.
NOTE HOW BADLY IT HAS BEEN BURNED.

with the lower timber line) in January and February, 1914. The purpose of this fire line is to afford cheaper and more effective protection to areas which should be devoted to the continued production of timber.

The conditions which had to be met were extraordinary, and it was found to



A SNAG, FILLED BY POWDER, SHOWING METHOD OF QUICK WORK IN CLEARING A WAY THROUGH THICK GROWTH FOR A FIRE LINE.



FOREST RANGERS CLEARING OUT THE BACK FIRE LINE.

be impractical, from the point of view of both cost and effectiveness, to construct a wide, clean line of the German type. Fires originating in the brush country burn with fearful rapidity, and if left alone would sometimes sweep over a line half a mile in width. The cost of the construction of a line of this width would obviously be prohibitive. It was therefore decided to construct a line from which an organized fight could be directed. The usual method of combating fires in this type of country is to get well in advance of the approaching fire and clear the ground of all inflammable material for a few feet in width. Then the country between the cleared strip and the approaching fire is fired. The two fires burn together and go out for lack of inflammable material to burn. This method of fire control is in common use all over the State of California, but there are several serious difficulties in combating a fire in this way. A back fire line has to be run hurriedly through very rough country; oftentimes it is not rightly placed and frequently it is not possible for a crew of reasonable size to prevent the back fire, set out along the hastily improvised line, from jumping the slight barrier interposed.

To offset these difficulties, the following principles were outlined to govern the construction of the new type of line. It was to consist of three parts: (1) The back fire line, which is a narrow cut through the ground cover to mineral soil—in all respects similar to a line which a fire fighting crew would cut out to combat a fire in any given type. (2 and 3) To insure the successful handling of any fire, this back fire line was supplemented by the removal of the more inflammable material, such as down limbs, snags or clumps of heavy brush, for an average width of 100 feet in front and back of the cleared back fire line, in order to reduce the extra hazard. These two strips were to be known as the front and back protection strips. With this dangerous material out of the way, a ranger in charge of an efficient fire fighting crew could get well in advance of an approaching fire and back fire without fear of the back fire getting away from him. Special

emphasis was laid on the removal of old snags in front of the line. These snags very often are the means of throwing sparks across the back fire line and cause the loss of control.



BORING HOLES WITH AUGERS FOR THE CHARGES OF POWDER WITH WHICH THE TREE IS TO BE BLOWN DOWN.

The detailed location of the line was determined on in advance by rangers who had had a long experience in back firing work. Advantage was always taken of topography that would render the fighting of a fire less difficult. Roads, trails, open plowed fields, were used where they occurred as a part of the back fire line.

Wherever possible the line was also made so that it could be used as the basis for a patrolman's beat. Tool boxes and telephone instruments will be placed at frequent intervals along the line to facilitate the control of an approaching fire. Signs will be placed at living springs so that no time will be



DEAD TREE BEING BLOWN DOWN BY A CHARGE OF POWDER.
THE SMOKE FROM THE EXPLOSION OBSCURES THE LOWER PORTION OF THE FALLING TREE.



METHOD OF PLOWING THE BACK FIRE LINE.

THIS WORK MAY ALSO BE SATISFACTORILY DONE BY DYNAMITING, THE EXPLOSION MAKING A DEEP AND WIDE TRENCH.

lost by the fighting force in locating available sources of water supply.

To do this work, twenty-four regular rangers were picked from the different forests in California, assigned to the Sierra Forest, and were there divided into two crews of twelve each. These crews were in charge of a foreman who was chosen from their number. The foreman subdivided his crew into groups that worked on different parts of the construction. Usually there were two snag crews, one equipped with falling saw, and the other equipped with augers and powder. In this connection, very interesting and valuable data in regard to the cost and effectiveness of these two methods of snag disposal was obtained. From four to six men were equipped with axes and it was their duty to brush out the back fire line for a width of ten to twelve feet and also remove such inflammable material as was necessary in front and behind this strip. After the line was brushed out,

two men came behind with a side-hill plow and plowed two furrows, one on each side of the back fire line, as close as the horses could go to the brush. The space between these furrows was then burned, leaving a back fire line free from any inflammable material.

The progress of the crews varied according to the type of the country, but each crew easily averaged a mile and a half of finished line per day. By February 20 the line had been built along the western boundary of the Sierra Forest, an approximate distance of one hundred and ten miles, at a cost of \$52 per mile. While the full value of this type of line cannot as yet be determined, there can be no doubt but that such a line will prove to be a big help in protecting the timber areas, simply because it will relieve the local organization from the necessity of constructing a line of less efficiency on very short notice and in the face of an approaching fire.

Plans for the Forest Products Exposition of Chicago, April 30th, are progressing satisfactorily. The preparations of exhibits by the affiliated associations is under way. A campaign of advertising, to induce attendance, will be undertaken in the near future. The manufacturers generally are requested to exert their utmost efforts toward creating interest in the expositions, which bid fair to be the most interesting and comprehensive ever held in this country.

PLANTING AND SEEDING OF WOODLOTS

BY GEO. LATTA BARRUS, NEW YORK STATE FORESTER

THE establishment of tree growth in the woodlot, or on large forest areas may be brought about by two methods, namely, natural reproduction and artificial reproduction. I wish to give some advice to woodlot owners on planting and seeding, and to draw their attention at this time to the planning of such work for the spring season. In another issue of this magazine there will be discussed the different systems to be followed in securing natural reproduction of forest growth. It will be learned from such discussion that, while natural reproduction is the ideal to be hoped for, there are certain fundamental requirements, at the start, necessary in order to make the adoption of that system possible, the most important factor being the presence of good seed trees of desirable species.

On vast areas of land in the United States not only are desirable seed trees lacking, but there are often no signs of any tree growth, leaving artificial reproduction as the only choice. Even in the small areas of woodlots there are often open spaces where planting or seeding is advisable to secure satisfac-

tory conditions. Thus, in any opening where grass is found, and where it would be difficult to secure reproduction of the best species, it would be wise to resort to planting. Only too often all the trees of the best species have been cut out from a woodlot, so that it would be impossible to secure their natural reproduction. Also it might be desirable to introduce species which had never grown there before. Again, in such spaces where the land is now occupied by large spreading trees of poor quality, it would be better to cut these out and plant.

There are very few woodlots which could not be very greatly improved by planting from one hundred to four hundred trees per acre. Like all other forest planting, the work can generally be done before the ordinary farm work is taken up, so that it will not interfere with that work. In case the market conditions warrant cutting of the poor material, generally the value received from such cuttings will be enough to pay for the cost of planting the woodlot with new stock, as this latter cost is very low.



Photo by C. J. Ayres.

THE LAND GIVES EVIDENCE OF BEING OCCUPIED IMMEDIATELY AFTER PLANTING.
SCOTCH PINE ON ADIRONDACK SAND.

The first thought which occurs to the land owner ordinarily is that he can secure a forest growth much more cheaply and satisfactorily by sowing the seed directly on the ground instead of planting the trees. Where it is desired to start a growth of hardwood trees this is sometimes true, especially in the case of black walnut, red oak, hickory and some of the heavy seeded hardwoods. In such cases seed can be gathered from the trees and set out immediately or kept over winter and planted in the spring. Where squirrels and field mice are especially numerous, the spring planting is preferable. In such work it is necessary to have the mineral soil exposed, and also to have leaves and grass removed from the spot where the seed is planted, or if the seed is to be sown, the ground should be dragged with a light drag or an old stub of a tree which will tear up the ground surface.

Experience in planting trees and sowing seeds in the field under varying conditions clearly indicates that planting is a successful method, while broadcast sowing is too expensive and uncertain to be used generally.

WHEN TO PLANT.

Most of reforestation work has been done in the spring as soon as the frost is out of the ground, so the trees could be shipped. This means from the early part of April to the latter part of May, depending upon local climatic conditions. It is also possible to do such planting work in the early fall as soon as the long summer drought ceases and the fall rains begin. Coniferous trees in some cases can be planted as early as the latter part of August, but for fall planting of hardwoods it is better to wait until later when the leaves begin to fall.

WHAT TO PLANT.

In answer to this question the first requirement is to learn what are the native species making the best growth on the kinds of soil where your planting is to be done, and then decide which species will give the product desired for your use or marketable in your locality.

Of the trees adapted for planting in the Eastern States, perhaps the following named are some of those most likely to be chosen for a special product: White ash and red oak, for hardwood lumber; black locust, European larch, arbor vitae and catalpa (in restricted range), for fence posts, grape stakes or hop poles; white and red pine, Norway and red spruce and tulip poplar, for a supply of softwood lumber; Norway or red spruce and Carolina poplar, for pulpwood.



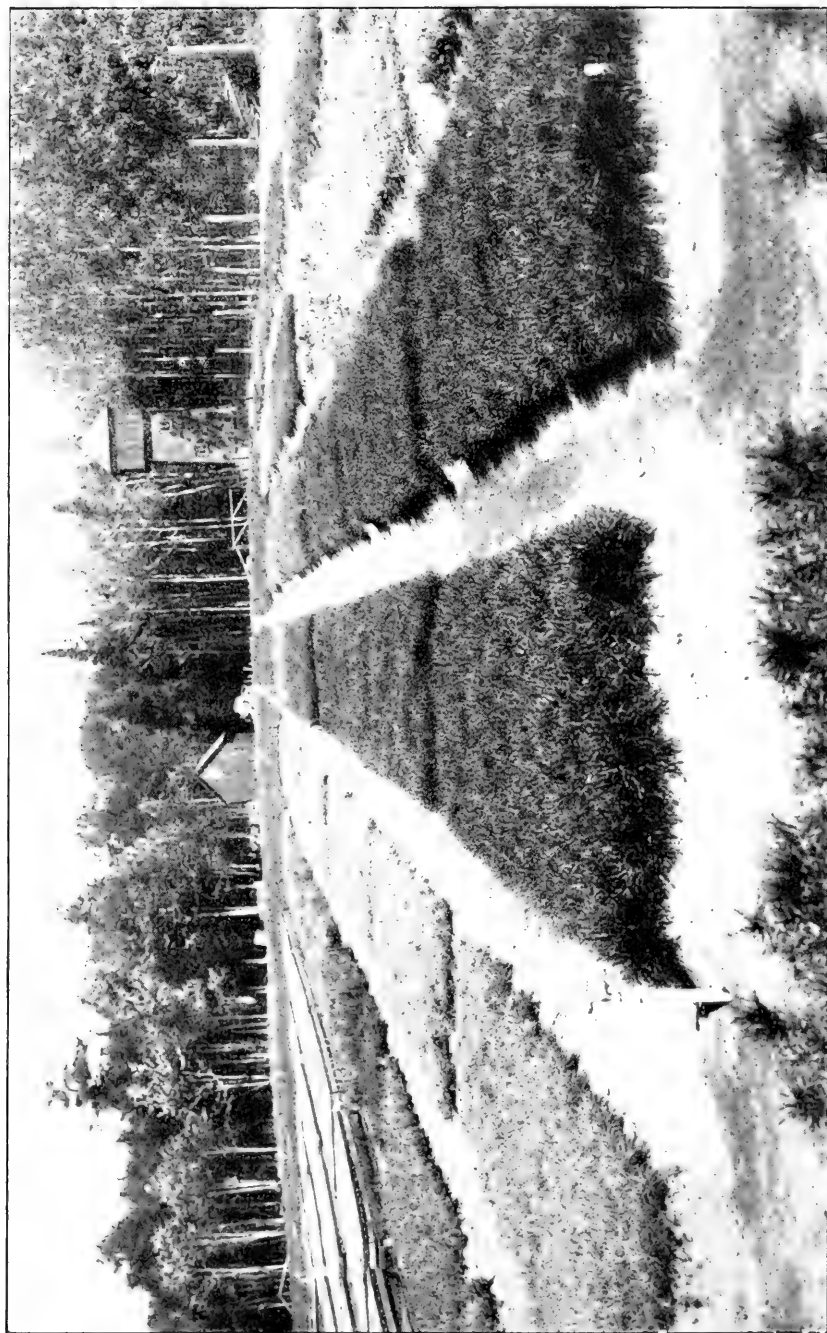
Photo by G. L. Barrus.

PITCH PINE SEED SPOT SIX YEARS AFTER PLANTING SEED.

In order to have the plantation successful and prove a profitable investment, there are certain factors, such as light, soil moisture, soil fertility, climatic conditions, fungus diseases and insect pests, which must be considered.

The pines are best adapted to light, sandy soils with but little fertility, while the spruce, tulip poplar and catalpa are quite exacting as to soil requirements.

The amount of moisture required by trees depends upon their root systems.



TWO YEAR SEEDLINGS IN THE NURSERY.

Such trees as Scotch, Austrian and red pine, black locust and red oak, make satisfactory growth on dry soil because their long tap roots are able to take up moisture from the lower sub-soil. There are no trees, however, which make a satisfactory growth on cold soils thoroughly saturated with water, because air in the soil is necessary.

All trees, in order to make a profitable growth, require light, but the maximum and minimum requirements vary considerably according to species. Light shade is beneficial to nearly all species when they are first planted, but some kinds, such as spruce, have the ability to withstand considerable shade. Often times there will be existing growth, such as grass, brambles, brush or brakes on the land to be planted. In such cases a liberal sized space should be cleared before planting the trees, so as to allow a fairly good opening to prevent the ground cover from choking out the trees or matting them down after the rank growth of the summer has been weighted down by the winter snow.

Of course it is hard to select any species which is not afflicted with insect pests or fungus diseases to a more or less extent. There are some species, however, which are especially undesirable for this reason. For instance, the chestnut should not be planted in the Atlantic States because of the chestnut blight, and in certain localities the locust borer works such havoc with plantations as to discourage the planting of this tree. Ordinarily, however, the locust will reach a size suitable for grape stakes or fence posts before the plantation is destroyed, and when sprout growth comes up after cutting, it gets a very good start before another attack is likely to occur. Where there is a ground cover of sweet fern the Scotch pine is apt to develop a fungus disease which requires the sweet fern as a host in order to carry out its life cycle. In some localities the white pine weevil causes considerable damage to plantations periodically and, in such cases, it might be best to consider the substitution of red pine.

SIZE OF TREES TO BE USED.

Ordinarily a land owner expects to receive trees three or four feet high, so

as to make an immediate showing, but the folly of using such stock is easily seen when we consider the cost of transportation, the increased cost of labor in setting them out, and finally the large percentage of loss where this large stock is used. Under most conditions the largest tree advisable for reforestation work is the four-year-old transplant and the use of this tree is not to be advised ordinarily unless there is filling in to be done where former planting has already made a fairly good start, or in



Photo by G. L. Barrus.

No. 1—FIVE YEAR OLD SCOTCH PINE SEEDLING FROM SEED SPOT.

No. 2—FOUR YEAR OLD SCOTCH PINE TRANSPLANT FROM NURSERY.

NOTE BETTER ROOTS ON NO. 2.

planting on very dry and exposed situations where the smaller transplants or seedlings could not survive. The best proportioned tree for ordinary planting is the three-year-old transplant which has a very well developed root system, even though the top does not make as much of a showing as that of the four-year transplant. The transportation of such trees is considerably less than the four-year transplant, and they are



THE FOUR STEPS IN PLANTING.

1. REMOVING GROUND COVER.
2. DIGGING THE HOLE.
3. SETTING THE TREE.
4. TRIMMING THE SOIL AROUND THE ROOTS.

much easier for the men to handle in planting.

In some cases, where there is not a dense ground cover, the two-year-old seedling will give satisfactory results, and when this stock is used, closer spacing could be adopted, assuring a sufficient number of trees for the final stand, even though a larger percentage of loss was encountered. In taking up such small trees from the nursery, we are bound to get a more complete root system with the small fibrous roots which are so essential to the growth of the tree.

HOW TO PLANT.

If the planting is to be done on a large scale, it will be necessary to organize the men in crews and to have trees purchased from a commercial or State nursery.

When the trees arrive they should be taken to the planting field and unpacked immediately. The roots should be dipped in water and the plants "heeled in," i. e., placed upright in a trench and the dirt packed tight around the roots. They can be kept in this manner while the planting is in progress.

The working unit is two men, one of them equipped with a grub hoe and the other with a pail for carrying the little plants. Two men working thus as a pair—one making the hole and the other planting the tree—will, after a little experience, set out about 1,000 transplants or 1,200 seedlings per day. If only a few thousand trees are to be planted, two men can do the work within the required time; but if many thousand, several pairs of men will be necessary.

In making a hole, it is well to cut off and remove a thin slice of sod, as this gives the plant a better opportunity to grow. The hole should be large enough to give room for the roots without crowding; but on a light soil the least dirt that is moved in order to set the plants properly the better it will be. The plant should usually be placed in the ground at the same depth that it was before; but on light, sandy soil it may be set slightly deeper. The earth should be packed about the roots thoroughly, so that the plant will be

able to get all the moisture possible from the surrounding earth. Care should be taken also to place the roots in their natural position.

Special pains should be taken to prevent any exposure of the roots to the sun. Once they become dry the plants are very likely to die. The trees "heeled in" should be kept moist at roots.



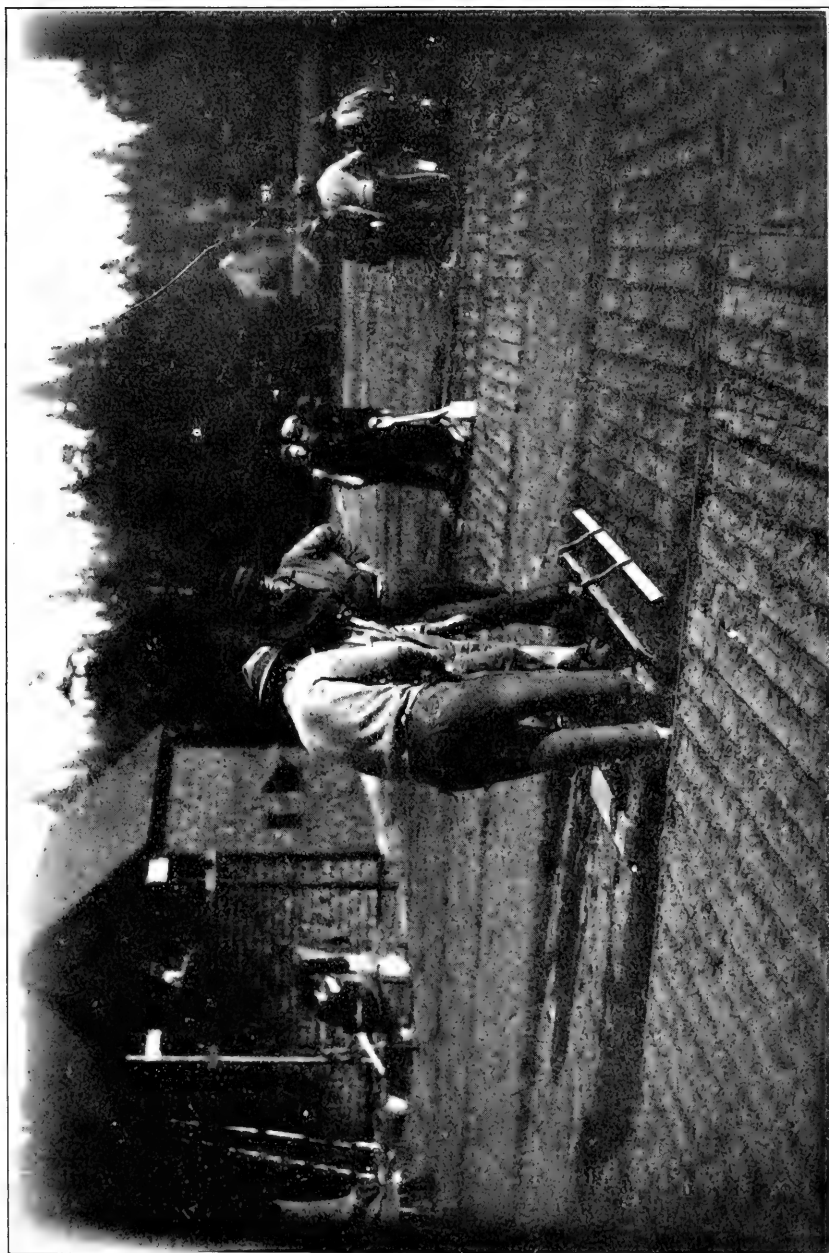
POSSIBILITY OF SCOTCH PINE AS A CHRISTMAS TREE.

In planting spruce special care must be taken to get the tree in the ground the same depth as it has been growing. The roots should also be placed in as near a normal position as possible.

Cultivation is not necessary before planting, but it will improve the growth of the plantation and is necessary for catalpa.

NUMBER OF TREES PER ACRE.

It is absolutely necessary that a much larger number of trees be planted on an acre than would be expected in a mature forest. It is not necessary, however, to crowd the trees the way they are found



USING TRANSPLANTING BOARD IN THE NURSERY.



BEFORE PLANTING.

This land is not fitted for agriculture. It is an evidence that the real cost of neglected waste areas on a farm is a general lowering of the whole farm value.

sometimes in nature, especially in natural seeding of white cedar or white pine. A close, dense stand is essential at the start in order to produce a proper development in the future growth, but it is wise to consider at the same time the initial cost of your planting, as this will affect the final profits.

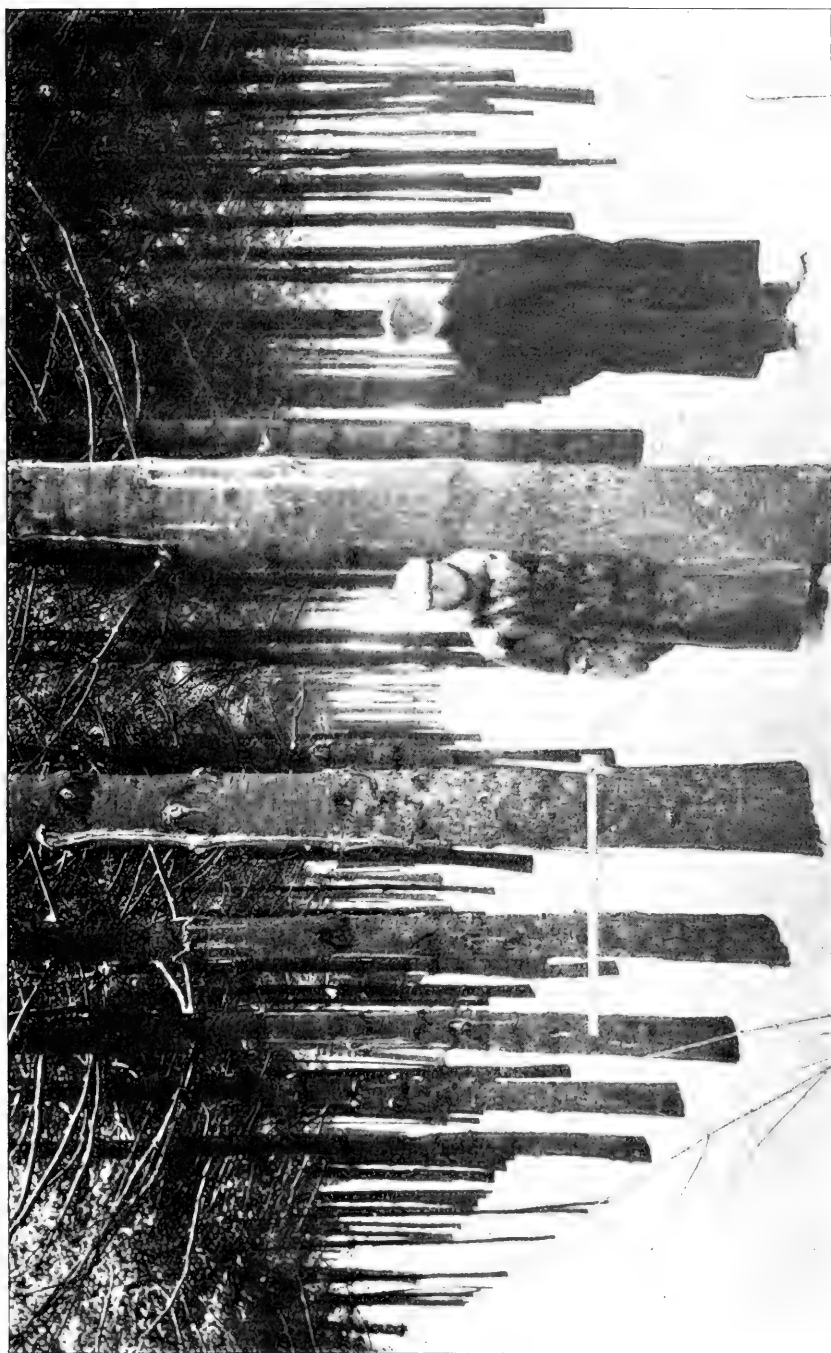
The close planting produces crowded and shaded conditions which kill off the side branches when the trees are small, reduce the number and size of the knots, and finally make a higher grade of lumber.

Such valuable results are easily seen when we compare the difference between trees which have grown naturally in a dense forest and those which have grown in the open. On the other hand, if too many trees are planted per acre, the cost is rapidly increased and tends to discourage the land owner from making the initial investment. Then too, the denser the stand, the sooner will thinning be necessary in order to get the best growth. Such early thinning ordinarily would not bring a profit in this country. In foreign countries where the fagot is in demand, closer planting and such early thinnings can be carried

on with some degree of profit. It is also possible that, if the right species could be grown on the soil in question, the early thinnings could be made with the idea of a supply of Christmas trees which would bring a profit in this country. The advisability of growing such a crop, however, would be governed largely by the proximity to available markets as well as the adaptability of balsam, Norway spruce or other Christmas trees to the soil where the planting is to be done.

In consideration of these factors, it is found that a spacing of six by six feet, requiring 1,200 trees per acre, is best adapted for most plantations.

The fast growing and light demanding trees, such as Carolina poplar and black locust, may be set at a wider spacing, for example, eight feet apart each way, requiring 680 trees per acre. In some cases a mixed plantation might also be desired where fast growing species would be alternated with slower growing and shade enduring species, with the idea that the faster growing tree would be taken out in the early thinnings. In such a case the trees might be planted



WHITE PINE PLANTATION RESULT.
28 YEARS OLD; 24,000 BOARD FEET BOX BOARD LUMBER PER ACRE.



FOUR YEARS AFTER PLANTING.

NOTE NOT ONLY THE MUCH BETTER APPEARANCE BUT ALSO THE VERY APPARENT INCREASE IN VALUE PER ACRE.

five feet apart, requiring about 1,740 per acre.

Planting in the farmers' woodlots should be done where necessary to fill up openings in the woodlots, which would take too long to seed up naturally, thus immediately putting all the land to productive use; to introduce new species to make the stand more valuable; or to ensure reproduction of most desired species, difficult to secure otherwise.

In underplanting in the woods, care must be taken not to plant where the light conditions or soil conditions are unsuitable to the species used; thus, white pine should have a moderate amount of light, Norway spruce could stand a considerable amount of shade and white oak would require much light.

Several States maintain nurseries where trees can be purchased at cost or at least at very reasonable rates. If there are no State nurseries, the State Forestry Department can refer you to reliable commercial nurseries and give you special advice for planting in your particular locality. Therefore the first thing to do is to communicate with the State Forestry Department. If there is no State Forest Service, then communi-

cate with the U. S. Forest Service at Washington, D. C.

Lumber companies or owners of large tracts remote from railroad lines can often avoid heavy transportation and hauling charges by establishing a small nursery near the planting site. The owner of a woodlot can perhaps even more easily start a small nursery in his garden patch.

The growing of hardwoods in a private nursery is perhaps even more a practical suggestion, especially for the owner of the woodlot. Seeds of the different hardwoods can often be collected in the vicinity of the woodlot and either sown in the fall or stored over winter and sown in the spring. If suitable precautions can be taken to prevent loss from squirrels or mice, better results usually are obtained from fall sowing from heavy seed of hardwoods, such as oaks, hickory, etc.

The seed could be sown in long rows spaced the same as transplants, so as to permit the use of a hand cultivator. The seeds should not be covered too deeply, ordinarily two to three times the diameter of the seed itself.

It is also possible and advisable in

some localities to gather small seedlings if they have come up naturally in a place where they are not desired, or too thick for a permanent stand. If transplanted in nursery rows for a year or two, they would develop much better roots and be better adapted for planting in permanent sites.

The cost of reforestation depends on many factors which go to determine the cost of the planting stock and the work of planting in the field. First of all the cost of stock will depend on where the same has to be purchased. There was a time, not many years back, when reforestation could not be advocated to any extent because trees could not be secured at a price reasonable enough to show results from a business standpoint. No one can expect land owners to undertake reforestation if they have to pay \$10 to \$30 per thousand for trees at the nursery. Since some of the States have started nurseries in recent years, commercial nurseries have come to realize this fact and they have been led to offer a smaller grade of stock suitable for reforestation at a more reasonable price.

In the majority of cases the public have not yet come to realize the fact that the best trees can be secured for reforestation at prices ranging from \$1.50 to \$6.00 per thousand. Of course such prices generally are quoted f. o. b. nursery so that the final cost of stock will depend upon the proximity of the planting site to the nursery. If you are fortunate enough to have your land located near a nursery where trees can be shipped by freight or hauled direct from the nursery by teams, the cost of stock will be at a minimum. If, on the other hand, the trees have to be shipped by express and then perhaps hauled twenty miles from express office to planting site, the cost is greatly increased.

The cost of planting is a still more variable quantity. The condition of land to be planted, the distance at which trees are spaced, the cost of provisions (depending on the season of the year or the distance to be traveled), the amount of lost time due to bad weather, the experience of the men, the supply of labor, and the size of operation, are all factors influencing the cost of planting.

The reports from private plantings show variation of cost per acre from \$3.00 for underplanting with 400 trees, to \$16.00 for a maximum where trees are spaced six by six feet, requiring about 1,200 per acre.

Probably an average cost per acre for trees and labor would be about \$8 to \$12.



Photo by G. L. Barrus.

POPULAR WHIPPING TOP OF RED PINE AND RETARDING ITS GROWTH.

IN CASE OF UNDER PLANTING REMOVE POORER SPECIES WHEN THEY INTERFERE WITH THE BEST GROWTH.

For planting in the woodlot, the work can often be done at such times as not to interfere with other work and with permanently employed labor, so that the only actual investment is the cost of trees, about \$3 to \$6 per acre.

Returns come within a short time. The trees in from three to five years cover the unsightly parcels, thereby increasing the value of the entire tract. Careful studies of growth made in plantations show good yields and money returns from reforestation. Planting is not a matter of sentiment, but a sound business investment.



CHARCOAL KILN IN THE SPESSART MOUNTAINS.
THEY RECEIVE ABOUT ONE AND A QUARTER CENTS PER CUBIC FOOT FOR THEIR LOPWOOD.

THE HARDWOODS OF THE SPESSARTS

By F. F. MOON, M. F.

THE statement was made a short time ago by no less an authority than Mr. Pinchot, that up to the present time, in comparatively few instances has timber ever brought a price in the United States equal to the cost of production. A trip to the great hardwood region of Germany, the Spessart Mountains of Hessen, proves this statement beyond cavil.

The Spessart Mountains are located in the bend of the Main River, are sterile as to soil, inclement as to weather, and unsuited for agriculture, but at present constitute a resource of enormous value, since they produce the bulk of the fine hardwoods for the German Empire. One-third of this region is devoted to timber production, and forestry and mining are the chief sources of employment for the inhabitants.

The development of this region as a broad commercial forestry proposition is of comparatively recent date as measured by their standards, regular silvicultural methods having been introduced about 1813. Previous to this time it had been used chiefly for a hunting preserve by the archbishops of Mainz. Even now portions of it furnish superior boar shooting, the Prince

Regent of Bavaria owning a large tract, completely fenced, near Rothenbuch.

When the church property passed into the hands of the state, the desultory methods were replaced by more scientific forms of management so that at present we find them handling these non-agricultural lands in an up-to-date manner instead of using methods that had their chief sanction from custom. Even now they realize that the rotations used in the past are entirely too long when the financial returns are taken into consideration, and that the mature stands of oaks and beeches, ranging in age from 800-1,000 years, while picturesque in the extreme, are not financially profitable, in spite of the high stumpage prices that prevail.

The revier at Rothenbuch gives a good idea of conditions and practices prevailing in this region. Mature forests are being rapidly cut off and replaced by seedling stands of oak and beech. Direct seeding is the chief method used in getting the stands started. The rows, approximately 1.5 meters apart, are hacked with a grub hoe at an average cost of about 30 marks per hectare (\$3 per acre), then the acorns are put in with a dibble at an additional cost of

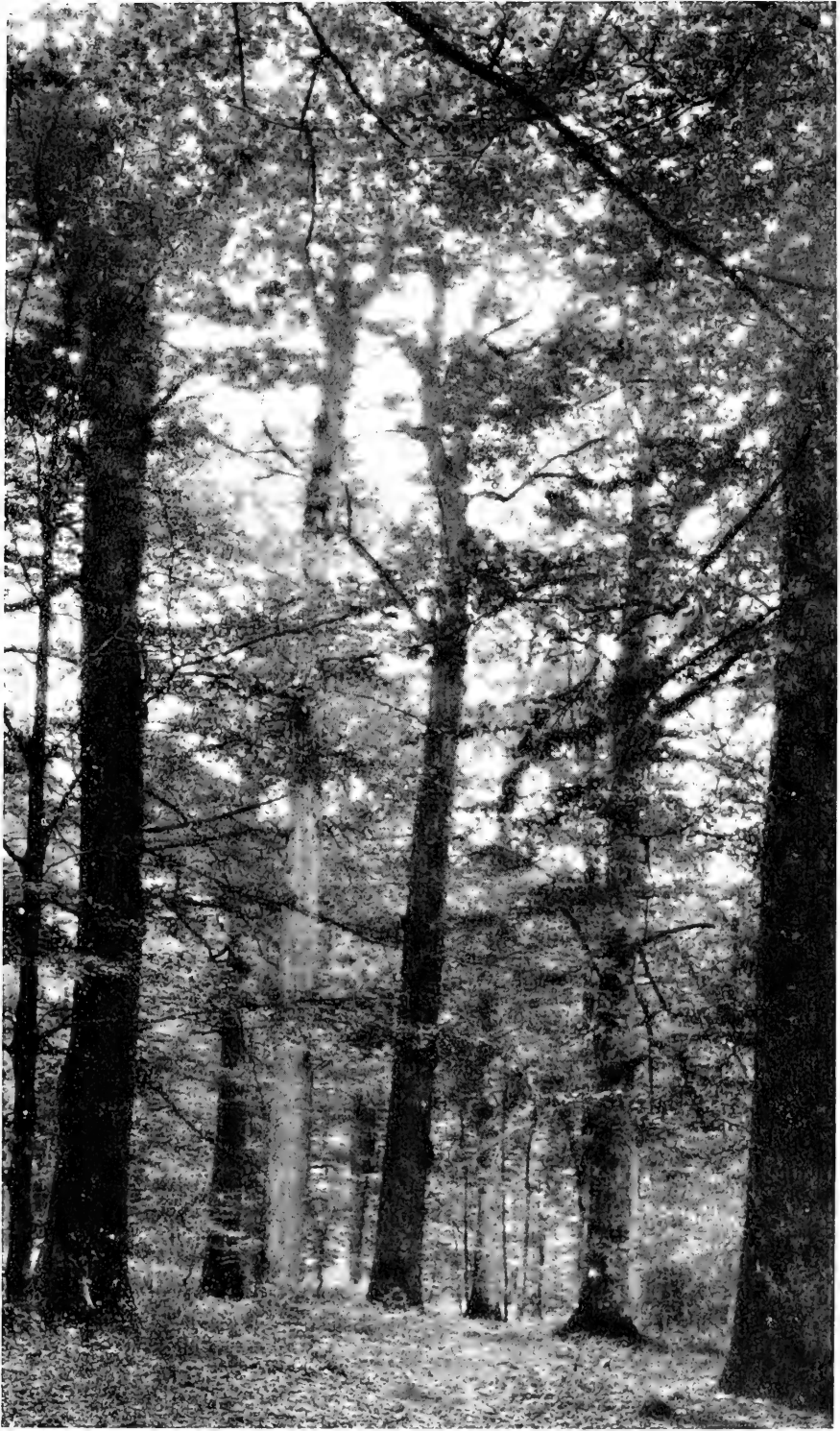


Photo by F. F. Moon.

STAND OF OAK AND BEECH NEAR ROTHENBUCK IN THE SPESSART.
THE OAKS ARE 800 YEARS OLD, SOME OF THEM HAVING 38 FEET CLEAR LENGTH WORTH \$750 EACH.



Photo by F. F. Moor.

ON THE ROAD FROM ASCHAFFENBURG TO ROTHENBUCK.

BEECH AND OAK COPPICE ON LEFT, CLEAR CUTTING NOW GOING ON IN CENTER AND PLANTATION OF AMERICAN WHITE PINE ON THE RIGHT.

8-20 marks per hectare. As a result they may get as high as 20,000 seedlings per hectare. (8,000 per acre.)

At present they are doing little in the way of artificial regeneration of beech, since in the words of Forstmeister Endres, "Beech is a weed in this locality, both as to germination and growth, and comes in the oak plantations of its own accord."

Frequent thinnings are made and if, as in some instances, the stand has come up ragged, they will cut it clean and get a coppice stand of greater regularity and vigor.

In the past hogs were often pastured in the woods at mast time to force the nuts and acorns into the ground. At present, while a good deal of grazing is permitted, no dependence is placed on way of getting a forest started; artificial regeneration being the rule.

The care which is exercised in the proper utilization of their material and their efforts to keep up the value and reputation of their products is abundantly justified, since the prices they receive are enormous and Spessart oak is widely known for its quality and in great demand.

The very best sticks of clear oak are sold for veneer, the lower grades are used for planks and staves, and the tops and defective portions are made into charcoal on the ground, thus making their utilization practically complete.

The age of their largest trees (small annual growth), of course insures the fine texture and uniform quality needed for the veneer industry. One reason that was given here for the close planting method and is found to prevail in other parts of Germany, is that this close competition during the first decade or two of the trees, prevents rapid spongy growth in the core. We have hardly reached the point in the United States where we care to sacrifice early volume growth for later quality.

That these efforts at price and quality maintenance are not lost, the value of

the logs bear witness. In 1911 the average price they received per stem of oak was \$142 (stems averaged a little less than 2,000 board feet apiece, making the price about \$75 per thousand on the stump). They have received as high as 470 marks per cubic meter of oak or an equivalent of about \$375 per thousand board feet.

For their veterans that are free from branches for some distance above the ground, there is great demand; a butt log that will run six meters free from branches, is worth \$250, and one that is eleven meters in clear length brings \$750, on the stump. It is needless to say that this class of material is most economically used, being cut into the finest veneers.

For the stave material they receive 42 marks per stare (7-10 of a cubic meter), or about 40 cents per cubic foot, while for their lop wood, etc., they get about 1 1-4 cents per cubic foot.

Regarding the financial success of their methods, it has been found that the compound interest charges very largely eat up the profits on long rotations in spite of the enormous returns per acre. They are now planning to reduce the rotation to 250-300 years for the oaks and to introduce the faster growing spruce and pine.

We have in our Southern Appalachians some of the finest natural hardwood land in the world; land far better suited for the raising of trees than for agriculture; land which in the memory of middle aged men, has been cleared, tilled for a few years, and then allowed to grow up to brush. It is eminently fitting that we profit by the example of the Bavarian and Hessian foresters and turn this vast area, now producing nothing but a fraction of its capacity, into a magnificent hardwood producing region so that in the United States, Appalachian oak, like Spessart oak in Germany, may be a term with which to conjure. With the vigorous extension of the Weeks Act it is not at all improbable.

A California firm is selling eucalyptus charcoal at \$24 a ton, as against \$20 a ton for oak charcoal. Since most of the California-grown eucalyptus do not make good lumber, uses for other products of the tree are being sought.

SALT LAKE PRESERVES TIMBERS

IN REPLACING a railroad trestle recently burned, along the north shore of Great Salt Lake, engineers have just found that the piles are still perfectly sound after forty-three years of service. Looking for the cause, since these were only of local pine and fir, they found the timbers were impregnated throughout with salt from the lake. At another point on the lake, eighteen inch piles, set twenty-nine years, are similarly preserved with salt, which has penetrated to their very center. Timbers in the Southern Pacific trestles across Salt Lake, placed in 1902, appear to be as good as on the day when the piles were driven. They have been preserved well above water line by the salt dashed on to them by the waves, a fact apparently anticipated by the engineers who built the trestles.

The first transcontinental telegraph line, built before the railroad, extended west from Salt Lake City through the prosperous mining camps of Eureka, Austin and Virginia City. When the railroad was built, the telegraph line was transferred to follow its right of way and the old poles sawed off at the ground. An engineer who recently examined the butts left in the ground in the salt desert near Fish Springs, found

that, although fifty years had passed since the poles were cut off, the old butts were perfectly sound.

Telephone and electric companies in the Salt Lake valley have used the local salt for preserving poles. When set up, about 75 pounds of salt is placed around the pole on the ground. This method cannot be used, however, when the pole is on or near a lawn, or in any place where vegetation is desired.

It is pointed out that the reason why the waters of Salt Lake act as a strong preservative, as distinguished from ocean waters, is because the lake water is so much saltier, being practically a saturate solution. Preservation with salt is of no use in ocean piling against the attack of teredos and other marine borers.

Experts in the Forest Service who have been investigating the preservative treatment of timber, offer the suggestion that ties and poles which have been immersed for some time in the waters of the lake ought to be impervious to decay, if the salt is not leached out by the action of the elements. It has been suggested that this can be guarded against, for example, by painting the butt of the pole with a coat of creosote, which will keep out the moisture and keep in the salt.

CARE OF SHADE TREES

THE Tree Committee of the Laurel Hill Association, Stockbridge, Mass., has evolved a plan for arousing interest in the systematic care of the village shade trees which commends itself to other communities. The plan is outlined for the guidance of others:

In order to plan more intelligently for tree planting and tree removal, the town of Stockbridge has had a chart of its village trees plotted to scale.

The work has been done with the approval and authority of the selectmen and the tree warden by the committee on trees of the Laurel Hill Association,

a village improvement society which prides itself on being the pioneer of such societies.

The village main street is 100 feet wide and flanked on either side by a row of trees. Elms predominate, supplemented by maple, ash, linden and pine.

The largest of the elms is $17\frac{1}{2}$ feet in circumference at a height of three feet above the ground and is probably about 160 years old.

In addition to the chart, the committee has issued a pamphlet for local distribution outlining briefly the number and varieties of the village trees

and showing the need of a comprehensive plan for the whole street in the matter of tree removals and replanting.

The charts and the pamphlet together make it easily apparent that the usual aversion to any sort of thinning of trees in public highways or parks is a mistaken attitude.

The committee have as yet charted only those trees on the roadway side of the property lines, but it is expected that property owners along the street, which is widely known for its perspective of arching trees and its well kept lawns,

will conform in their tree planting activities to the general plan indicated by the committee.

In addition to this landscape study, the committee supplements the town and private activities in the nature of spraying, trimming, and general care of the trees and expects to systematically call the attention of the residents of the town to any State or Federal bulletins on these general subjects as may be from time to time available for general distribution.

MARYLAND CONSERVATION ASSOCIATION

THE first annual conference of the Maryland Conservation Association at John Hopkins University, proved to be a very successful and encouraging gathering of Marylanders in the good cause. The preamble to the by-laws of the association contains the statement that this association has been formed through the interest aroused by the Fifth National Conservation Congress, which was largely attended by Marylanders. That those attending the Congress felt desirous of advancing the cause of conservation in Maryland, and of reviving the organization formed some years ago for that purpose.

The addresses at the conference were as follows:

Conservation in the Nation and in the State, Senator Moses E. Clapp, of Minnesota.

The Smith-Lever-Agricultural Demonstration Bill, Congressman A. F. Lever, of South Carolina.

Relation of Farm Co-operative Demonstration Work to Soil Fertility, Brad-

ford Knapp, Esq., United States Department of Agriculture.

Bird Refuges and Game Propagation, John B. Burnham, Esq., New York, President, American Game Protective & Propagation Association.

The Shellfish Industry, Dr. H. F. Moore, Chief, Division of Fisheries.

The Bearing of Pollution of Tidal Water on Health, and the Necessity of Control of Pollution, Surgeon H. S. Cumming, United States Public Health Service.

The Value to Maryland of the Control of Water Carried Diseases in Town and County, and Measures Necessary to Accomplish It, Surgeon L. L. Lumsden, United States Public Health Service.

Patapsco Forest Reserve, Miss Katharine Lürman.

Old Fort Frederick, Judge Henry Stockbridge.

Forestry, Dr. Henry S. Drinker, President, American Forestry Association and President, Lehigh University, Pa.

GEORGE W. VANDERBILT DEAD

IT WAS with the deepest regret that members of the American Forestry Association heard of the death recently of Mr. George W. Vanderbilt, of Washington, D. C., a vice president of the association and a man who has done much for the cause of forestry. The success of the forest planting on the

estate of Mr. Vanderbilt at Biltmore has long been known to students of forestry and has been an object lesson and an inspiration for similar work in other parts of the country. What Mr. Vanderbilt has done for forestry will be the theme of an article in an early issue of AMERICAN FORESTRY.

HOW TO SAVE \$100,000,000 A YEAR

SO GREAT are the possibilities and so urgent the need of wider use of preserved timbers that it is estimated that \$100,000,000 a year would not cover the saving which could be made by the universal treatment of woods in commercial use, which are exposed to decay. A Forest Service bulletin issued five years ago made the estimate then that about \$72,000,000 a year would be saved if proper preservative treatment was given to all kinds of structural timber which can be treated with profit.

In order to show the wood using public just what may be done in wood preserving, the American Wood Preservers' Association has decided to have an elaborate exhibit at the Forest Products Exposition in Chicago, from April 30 to May 9, and in New York from May 21 to May 30. This exhibit will show the development of an industry which has trebled in the number of plants and quadrupled in the capacity of output during the past 10 years. By charts and graphic representations will be indicated the wonderful saving of treated over untreated material on both a cost and physical basis. All of the commercial woods of the country will be shown as to their adaptability for treatment, and the preservatives and processes best suited for various woods in different conditions will be exhibited. Railroad cross ties, which are treated to the extent of over 32,000,000 annually, represent the most important phase of the industry; but wood in a hundred other forms can be chemically preserved, and the more important of these miscellaneous uses, will be shown by actual wood specimens. The list of miscellaneous material suitable for treatment, includes piling, poles, paving blocks, construction timbers, cross-arms, fence posts, mine timbers and lumber of all kinds.

As irrefutable proof of the efficiency of proper treatment, many actual specimens of treated material, which has had long service, will be shown. There will

be creosoted piling from Galveston, which is still sound after 37 years in teredo infested waters; there will be wood blocks which have served as flooring for over 30 years; creosoted ties with a record of a quarter of a century in situations where untreated ties of the same character will rot in six years. There will be shown the possibilities of treating wood such as gum, sap pine, beech and other hardwoods, which rot quickly, so that they will resist decay almost indefinitely. This one development has opened an enormous field in the utilization of timber for which there was little or no market untreated.

The exhibit will demonstrate, for example, the advantages of framing timber before treatment, the boring and adzing of cross-ties before treatment, the distribution of preservatives in various woods, and the application of established principles in the preservative processes and ultimate use of the material. The more general educational features will be fully covered. In the center of the space will be a model of a typical plant and yard showing the equipment and general layout of a modern plant, also a model of a creosoted silo. Supplementing this will be transparencies and bromides of both general and special features in plant construction and operation, and the use and character of treated material.

Fundamentally the exhibit is being planned with the hope of bringing home to the lumberman, the architect, the engineer, and the general public, a realization which they have never had before of the magnitude and economic importance of the wood preserving industry. A lesson in conservation will also be taught through the obvious reduction of waste and the fuller service from wood in many forms. If the lessons which the exhibit will teach were fully applied, the economy expended would duplicate the annual expenditure on our army or navy in times of peace.

FORESTRY LAW FOR VIRGINIA

SUCCESS has crowned the efforts of the friends of forestry in Virginia, who were inspired and vigorously aided by the American Forestry Association, to secure the passage of a forestry law in that State, ably directed by Senator R. S. B. Smith, the father of the bill, the campaign which secured its passage not only was successful but it has resulted in arousing state wide interest in forestry. The bill described in the AMERICAN FORESTRY for March, passed the Senate unanimously, and the House by a vote of 86 to 3, and has been signed by Governor Stuart. Virginia will now have such forest protection as it has so badly needed for many years past, and it is earnestly hoped that the operation of the law for the next two years will arouse the entire State to demand from the next Assembly, in 1916, a more complete forestry law and one which will provide for a liberal appropriation for the thorough development of the forests of the State.

The forests of Virginia supply the raw materials for an industry which is exceeded in the value of its production only by agriculture. Over 3,500 saw-mills operate in the State. The total amount of wood contributed annually by the forests exclusive of that for domestic use has a value of about \$25,000,000. Probably but one-third of this sum went to the owners of the timber, the remainder going principally to the wage earner.

Protection of the forests which supply the timber for these products is of fundamental importance. Fire is the forest's greatest enemy. The damage from fire in Virginia has been enormous. Probably as much timber has been killed by fire or burned up as has been

utilized. Thousands of acres are burned over annually and the normal loss each year by the injury to and destruction of mature timber is at least \$350,000. To this must be added the losses from the destruction of young growth, deterioration of the soil, slower growth of the timber, injurious effect on water resources, interruption of business, and depreciation of other property.

Virginia has a productive forest area of about 15,000,000 acres. On this area as a whole it is safe to say that the average annual production per acre does not amount to more than 150 board feet of log material. The total annual growth is, therefore, about 2,500,000,000 feet, which is less than the annual cut.

Through the application of forestry, including first of all protection from fire, this annual growth should be more than doubled. If, however, it were increased by only 10 board feet an acre, the annual timber growth of the State would be greater by 150,000,000 board feet. At the low rate of \$15 per thousand, this amount, if manufactured, would be equivalent to an increased annual income from timber products of \$2,250,000, to be distributed not only among the land owners, but mainly among those who furnish the labor and materials for marketing these products. To obtain this increased income the State could well afford to invest an appropriation of \$10,000, \$20,000, or even \$30,000. Sums such as these would moreover be very cheap insurance for the protection of standing timber estimated at upwards of 30,000,000,000 board feet, worth over \$60,000,000 to the owners, and many times that to the people of the State if saved for manufacture.

The Twelfth Annual Meeting of the National Lumber Manufacturers' Association will be held in Chicago in connection with the Forest Products Exposition May 5th and 6th, 1914. A program dealing principally with the merchandising of lumber is being prepared, to include addresses by representative architects, contractors, salesmen, fire insurance interests, retailers, etc.

A NEW SOAP MATERIAL

SETTLERS in western Kansas are cutting and marketing soap weed, or Spanish bayonet, to supply the demands of soap manufacturers, according to a report recently received from officers of the Kansas national forest. There are various plants in the southwest locally known as soap weed, called amole by the Mexicans, but the one gathered by the Kansas farmers, technically known as *Yucca bacata*, a species with exceptionally large fruits, is the most used. The soap manufacturers, however, utilize the tops or the roots. Manufacturers are paying \$8 a ton for the plant at the railway stations, while the estimated cost of cutting, drying, baling, and hauling ranges from \$5 to \$6, depending upon the distance to the railroad. Since a man can ordinarily get out a ton a day, the gathering of the soap weed affords an opportunity to secure a fair day's wages at a time when other ranch activities are not pressing. After cutting, the soap weed is allowed to dry from 60 to 90 days and then is baled up in the ordinary broom-corn baling machine.

For a long time this weed has been made into a soapy decoction which the Indian and Mexican women have used, particularly for washing their hair, for

which purpose it is considered especially suited, since it contains no alkali. Present day soap manufacturers use it for toilet and wool soaps. Its qualities have been known for a long time but the harvesting of soap weed is just now becoming commercially important.

The industry is now operating on lands adjacent to the Kansas national forest and it is expected that the demand will soon spread to that forest, some portions of which bear an abundant supply of the plant. There is a plentiful supply of it throughout southern Colorado, Arizona, New Mexico, and Texas.

Forest officers have considered this weed a nuisance since it is the nature of the plant to spread over extensive areas and kill off other vegetation. It is particularly a pest on stock ranges. In line with its policy of range improvement, the Government is anxious to rid the forage areas of all such injurious plants, and it is the hope of the forest officers that the commercial demand for soap weed will soon reach such proportions that it will not only take an otherwise useless product, but also will eradicate it from areas which could be utilized to better advantage for the supplying of forage to cattle and sheep.

WHITE PINE GROWING PROFITABLE

THE growing of white pine, says the Department of Agriculture in a bulletin recently issued on the subject, is a profitable undertaking at 6 per cent compound interest. To bring in these returns, the trees may be cut when not more than from 35 to 70 years old.

The original white pine forests are approaching exhaustion, according to the department, and with the growing scarcity of large-sized, high-grade white pine lumber, lower grades now find a ready market. Besides this, the tree

grows rapidly, has a heavy yield, and is easy to manage.

Second growth white pine, 50 years old, on good soil, may yield as much as 49,000 feet of lumber per acre. On medium soil, stands of the same age 36,000 board feet, and even on poor soil, 24,000 feet. White pine boxboard lumber, one of the chief products of such stands, sells for from \$12 to \$18 a thousand board feet. Material for making matches, another product, sells for from \$17 to \$18 a thousand. Even larger material, suitable for sashes and

blinds, some of which may be cut from a 50-year-old stand, brings from \$30 to \$35 a thousand feet. Second-growth white pine, the kind that is found on thousands of abandoned fields and pastures in New England, and that which has sprung up after lumbering in many places where the original white pine forests stood, has a value today, says the department, that makes it well worth the attention of the owner.

Too often, caution the forest officers, the farmer or other land owner sells second-growth white pine stumpage for less than it is worth because he does not know how much lumber the stand is actually capable of yielding, or else is ignorant of the price the lumber and other products will bring. Too often, also, the foresters say, the owner of second-growth fails to realize that perhaps by holding his pine trees for a few

years longer, or by thinning it properly at the right time, he can obtain a great deal more and better timber, and consequently a much larger relative return in money, than if he allows it to be cut clear when the first opportunity offers.

The best second-growth white pine, 45 years old, will yield about 42,000 board feet per acre, but the same stand, when 55 years old, will yield 55,000 feet, an increase of 13,000 feet per acre in 10 years. And this is not all, for along with the increase in quantity comes an increase in quality. Not only more, but better timber is to be had. Counting in this factor of quality, the lumber from an acre of best white pine, 55 years old, is worth about \$1,000 against a value of \$750 when the stand is 45 years old.

BEST SEED YEAR FOR LONGLEAF PINE

FOREST officers who have just returned from the southern states say that 1913 was the best seed year for longleaf pine for a long period of years, and that throughout its range the tree produced a full crop of seed. This is said to be particularly noteworthy because the species matures seed no oftener than from six to eight years, and often at longer intervals. In many sections the seed last year was so abundant that it collected in little heaps in ruts and other depressions.

Not only was the seed crop abundant, but weather conditions were unusually favorable, and by early December most of the seed had germinated and little seedlings 2 or 3 inches high are now growing in great numbers. In some cases, however, there was insufficient moisture during the fall, and the seed lying over the winter will germinate early this spring.

Throughout Louisiana, Mississippi, and eastern Texas many thousands of acres of longleaf pine forests are now carpeted with these seedlings. Counts made in December by the State Con-

servation Commission of Louisiana showed groups of seedlings as far as 300 feet from the nearest seed tree. Longleaf pine seed is relatively large, but it bears a filmy wing which causes it to revolve spirally when it is dropped from the cone, so that if winds prevail at the time the seeds are released they may be carried for considerable distances.

The reason forest officers are calling attention to the abundant seedling growth is that they may bring home to the owners of longleaf pine woodlands the peculiar need at this time for protecting these woodlands from fire. They point out that it would cost from five to ten dollars an acre to restock by artificial means what nature has done gratuitously this last fall, and emphasize the fact that the owners of longleaf pine lands, where natural reproduction has taken place in this way, should not fail to fight fires vigorously this season, and as many seasons thereafter as possible.

It is a common belief in many parts of the south that longleaf pine will not reproduce itself. This belief has arisen,

the foresters say, through a combination of the relatively rare seed periods and the annual recurrence of fires which run over the ground and destroy both the seed and such little trees as may start. The thick bark of the mature

longleaf pine makes it comparatively fire-resistant, but tender young trees are readily killed, and consequently the necessity for protecting them in a critical year like the present is particularly urgent.

WINTER FOREST FIRES

REPORTS for the winter fire season in the southern Appalachians covering the months of January and February, recently received by the Forest Service, show that the winter has been dry and that fires have occurred on land which the government is acquiring under the provisions of the Weeks Law. While these two months are normally not so dry as the fall or the spring fire season, serious fires may occur in an open winter, though they are not usual.

During January there were nine fires, five of which covered more than ten acres each. In February there were ten, of which only two spread over more than ten acres. All of these fires

occurred during the latter part of January and the first of February, when the weather was unusually dry.

The fact that the fires were reported from southern Virginia to northern Georgia, shows that the danger from fire was widespread. However, they occurred on only four of the twelve areas within which land is being purchased.

At least three-fourths of the fires were due to railroads. Forest officers say that until the southern states adopt and enforce laws requiring the use of adequate spark arresters on railroad locomotives, losses from forest fires can scarcely be prevented.

THE FOREST RANGER.

Up through the high lands, the low lands, the snow lands;

Covered with dust and decay of dead trees;

Mushing the mire lands; facing scorched fire lands—

The ranger's the man who is there, if you please!

Fording swift furies of wild mountain torrents;

Bound by the weight of his fifty-pound pack;

Over forest-choked passes; through torn jungle masses—

The ranger—it's him you should pat on the back!

Twelve-month or eight-month, the long or short-term man;

The man who puts seedlings in dead seedless slopes;

Roustabout, ax-man, college man, pack-man—

Your hat to them all, to their aims and their hopes!

Out in the wilderness, stripped of all mildness;

Blood pulsing strong like the full sap of fall;

Hearts full of gentleness; memories the tenderest—

It's the ranger—here's health to them all!

P. C. Smith, 713 East Olive Street, Seattle, Wash.

AMERICAN FORESTRY ASSOCIATION EXHIBIT

AN EXHIBIT of the work of the American Forestry Association will be made at the Forest Products Exposition at the Coliseum in Chicago, from April 30 to May 9, and at the Grand Central Palace, New York City, from May 21 to May 30. This exhibit will be in charge of representatives of the association and will be one which should attract a great deal of attention. Progress being made in the work of securing proper forestry laws in the various States, the organizing and encouragement of various State and local associations for the care and protection of forests, and the general

activity of the association in securing the wise conservation of forests and forest products will be explained to visitors. Members of the association are urged to attend the exposition and to take their friends to the association's exhibit.

The Forest Service will also participate and have perhaps the most complete exhibit it has ever displayed. Congress has appropriated \$10,000 for this exhibit.

Scores of lumber associations and various industries connected with the lumber and wood working business will also be represented.

FOREST NOTES

Members of the Tri-Counties Reforestation Committee of San Bernardino, Riverside and Orange counties, California, are much interested in conserving the flood waters of the Santa Ana River, and are giving their active aid in the endeavor to satisfactorily settle the problem which the difficulty presents. Francis Cuttle is chairman of the committee.

Sixty million feet of timber and 42,000 poles are offered by the government on the Kaniksu National Forest, near Priest Lake, Idaho. The timber is said to be of exceptional quality and all of it lies within four miles of Priest Lake, so that it is readily accessible and can be easily examined by prospective purchasers before the date on which bids are closed, June 1. Except for the pole material, which is cedar, the principal species are white pine and yellow pine. The timber now occupies some 5,000 acres.

One hundred and seven fires were reported during the last fire season to the Northern Forest Protective Association, with headquarters at Munising, Mich., according to the report of Secretary-Forester T. B. Wyman at the

annual meeting recently. Of these, 45 were caused by settlers clearing land, and 22 by locomotives. The loss amounted to \$1,900. The fire loss on abutting lands not listed with the association was \$12,600. Mr. Wyman reported plans for making the association's work still more effective, and addresses were made by State Forester Marcus Schaaf, R. S. Kellogg, secretary of the Northern Hardwood and Hemlock Association, and others. The area patrolled by the fire wardens during the fire season was 2,139,081 acres, and 22 wardens were used. Secretary Wyman emphasized the value of publicity work in educating the people to the necessity of taking proper precautions to prevent fires. The directors elected are: Thornton A. Green, timber lands, Ontonagon, Mich.; C. V. R. Townsend, Cleveland-Cliffs Iron Co., Negaunee, Mich.; W. H. Johnston, Oliver Iron Mining Co., Ishpeming, Mich.; James E. Sherman, Michigan Iron & Land Co., Marquette, Mich.; A. E. Miller, J. C. Ayer Estate, Marquette, Mich.; C. H. Worcester, Worcester Lumber Co., Chicago, Ill., and Chassell, Mich.; F. H. Smith, Oval Wood Dish Co., Traverse City, Mich.

Members of the Kennebec Valley

Protective Association held their second annual meeting at Augusta, Me., on March 3rd, and reported that the fire protective work done during the year was most satisfactory. The expenses for the year were so small that it was not necessary to make an annual assessment. The efficiency of the State work for the prevention of fire, a favorable summer and no protracted dry periods, all relieved the association of much expense for fire patrol or fire fighting. E. P. Viles of Skowhegan was elected president; W. J. Lanigan of Waterville, vice president, and F. H. Colby of Bingham, secretary-treasurer. F. H. Billard of New Hampshire spoke on the necessity of collecting accurate data to aid timberland owners to ascertain the cost of proper fire protection and the value of the work. President Viles also made an address on forestry conditions in Maine.

Among the many plans proposed for aiding in the prevention of floods, now that the flood season is near, is one for artificially increasing the absorbent qualities of subsoil on farm areas, slopes stripped of forests, and vegetation, by the use of dynamite. The plan appears to have merit as applied to farm lands for more reasons than its value in flood prevention, as by increasing the absorbent area of the soil it permits the retention of moisture to a greater degree than under normal conditions and this has a decidedly good effect in increasing the yield of crops. It is calculated that dynamite cartridges in holes three feet below the surface and 15 feet apart, exploded when the soil is dry, shatters the subsoil without creating any surface disturbance, and the water-holding capacity of the soil is greatly increased thereby. Experts declare it is particularly valuable in preventing erosion of side hill farms. The cost is estimated to be about \$15 an acre, and the treatment necessary once in 10 years.

An executive order just promulgated has resulted in an elimination of lands from national forest areas in Oregon.

This readjustment of boundaries has resulted in a total reduction of gross

area on the Paulina and Deschutes national forests of about 400,000 acres. The lands eliminated are located in the east-central part of the State, a considerable portion being on pumice lands of low fertility and little value for present or future forest purposes. A portion is located near the Deschutes River and already comprises a large percentage of private lands, and includes two towns. These eliminations are a part of the work of boundary examinations initiated five or six years ago, which is resulting in fixing, after careful survey, the definite boundaries of those lands which should remain permanently in forests.

The present eliminations are made because the land is not required for forest purposes or for the protection of watersheds. The lands have considerable grazing value, but only a small portion are suitable for agriculture under present conditions.

Secretary Lane of the Interior Department has recently given direction that an unnamed lake of great beauty in Glacier National Park be called Lake Ellen Wilson, in honor of the wife of the President. At the time of his visit last summer to Glacier National Park in Montana, Secretary Lane and his party were much impressed with the beauty of this lake which lies along the trail from Lake McDonald to Upper St. Mary Lake. This lake is about a mile long and half a mile wide. Lying more than a mile above sea level, the forests and cliffs which surround it are reflected from its surface as in a mirror.

The comprehensive report on the wood-using industries of New York, just issued by The New York State College of Forestry at Syracuse, shows results of first attempt to take stock of the use of forest products in the State. In line with suggestions above, it shows that such small and seemingly unimportant things as shoe lasts, dowels, spools and bobbins, wooden toys, wooden turnery, handles, brushes, small furniture parts, etc., are now being manufactured out of slabs, edgings, short

lengths, trimmings, defective tops and butts.

L. G. Johnson, formerly Deputy State Forester of California, has accepted the position as yard manager with the Frazer Lumber Company of Sacramento, California. Johnson is from Michigan Agricultural College, where he received his forestry training. G. M. Homans, State Forester, has appointed Alex W. Dodge to take the office made vacant by Johnson's resignation. Dodge is a Californian and graduated from the Yale Forest School in 1912.

It was most gratifying to President George E. Rex and the other officials of

the American Wood Preservers Association to find that over 20 committee members answered the call to meet at Chicago during the recent convention of the American Railway Engineers' Association. There was a time, not long ago, when less than 20 attended the annual meetings. The growth of the wood preserving industry and the rapidly growing realization of the value of treating wood for commercial use is now concentrating interest on the wood preservers' association and the important work it is doing. At the Chicago meeting committee reports were heard and arrangements completed for the exhibit at the Forest Products Exposition and for the plan of the next annual meeting.

BOOK REVIEWS

Logging, by Ralph Clement Bryant (John Wiley & Sons, \$3.50). Mr. Bryant's series of articles in AMERICAN FORESTRY have attracted so much attention that it is idle to state that his book on the principles and general methods of logging in the United States is also heartily praised. It supplies a demand which for years has been apparent. The volume was prepared as a text book for use in the forest schools, but has had a much wider sale and is of interest and undoubted value to every one connected with the logging industry.

Economic Woods of the United States, by Prof. Samuel J. Record (John Wiley & Sons, \$1.25). The need of foresters, timber inspectors and wood users to be able to distinguish the woods with which they deal inspired this book. The number of such woods is so large and the difference between many of them so slight that mere familiarity with their general appearance is not always sufficient for their proper identification. This book supplies information and illustrations which largely solve the problem of identification.

A Forest Idyl, by Temple Oliver (Sherman,

French & Co., Boston, \$1.20). A story of the poetry of rural life, the value of getting back to Mother Nature and at the same time a cleverly woven romance, make this book entertaining, instructive and restful, and a strong plea for the back-to-the-land movement.

Trees in Winter, by Albert F. Blakeslee and Chester D. Jarvis (Blakeslee and Jarvis, Storrs, Conn., \$2.00). Many people desire to know what trees to select for various purposes, where, how and when to plant them, and how to care for and protect them. This book aims to give such general knowledge of trees and tree conditions. It is well illustrated.

The Commuter's Garden, by W. B. Hayward (Crowell Co., New York, \$1.00). This is a book for those who love gardens and take care of them. In an interesting manner is given information about care of lawns, flowers, plants, vines, shrubbery, hedges, and in fact about everything in relation to a garden which may prove of value. There are also hints about care of hens, cows and bees. It is good reading.

Fifteen small sawmills are cutting timber from the Powell national forest in southern Utah, more than 100 miles from the nearest railroad. They are run by settlers during time that can be spared from the crops, and supply local needs, since there is no opportunity to ship timber in or out.

That a serious decline in the carrying capacity of vast areas of western grazing lands, due largely to the fact that stockmen fail to give the range plants a chance to keep growing, can be remedied without closing these areas to cattle and sheep, is the statement made by the Department of Agriculture in a bulletin recently issued on range improvement. Excessive grazing in the spring before the forage crop is mature, and such grazing continued year after year, says the department, are the main causes of range deterioration.

STATE NEWS

Missouri

The Board of Curators of the University of Missouri at its regular meeting February 18, 1914, delegated the administration of the College Lands to the Department of Forestry of the College of Agriculture. The College Lands comprise more than 50,000 acres in the Ozark Region of Missouri. They are the remnant of the land grant received by the University from the United States under the terms of the Morrill Act of 1862. These lands are chiefly valuable for forestry and the Department of Forestry has formulated plans for their administration and utilization.

On vesting the management of these lands in the Department of Forestry, the Board of Curators has provided the funds necessary for meeting the expenses of administration, including the employment of forest wardens for local patrol work. Four forests will be organized this spring, a field force built up, and boundaries established and posted. Sales of stumpage will be made where advantageous.

Special funds were also provided for a reconnaissance survey and the Department of Forestry expects to cover the whole area this summer. Work will start June 15, directly after the close of class work at Columbia, and will continue for three months. Two parties will be maintained in the field. The Department of Forestry will give its whole attention to this field work and to a study of the wood using industries of the state during the coming summer; no Summer Forest Camp will be opened this summer, since with the change in the curriculum the Camp has been advanced from the end of the sophomore to the end of the junior year.

Ohio

The *Ohio Forester*, the organ of the Ohio State Forestry Society, will hereafter have a certain portion of each number edited by the faculty and students of the Forestry Department of the Ohio State University.

By this means the department of the University will have a publication and at the same time the *Forester* will be strengthened and increased in its scope.

Mr. Edmund Secrest, chief of the Department of Forestry of the Ohio Agricultural Experiment Station, has just returned from Europe, where he spent the past autumn and winter studying forest conditions in several European states.

Vermont

At the last session of the Vermont Legislature, the State appropriated \$10,000 to the Agricultural College for agricultural extension work. An Extension Department of the College has been formed, and numerous short courses have been given in the rural communities of the State. One of the faculty of

this School, is a trained forester, Mr. B. A. Chandler, who is a graduate of the Yale Forest School. In his connection with the Forestry Department of the State Mr. Chandler has become well acquainted with the local conditions and is, therefore, well able to give the farmers and the timber land owners the kind of information which they must have in dealing with their woodlands. Particular interest is manifested in the matter of timber estimating. The farmers are beginning to realize that they have, in many cases, sold their timber for much less than it was worth. Now that the Lever Bill has passed Congress, a much larger sum will be available for the Agricultural College for extension work, and it is hoped that forestry will receive its fair proportion of this sum, since the Congressional allotment is on the basis of similar allotments by the states, and Vermont is spending as much for forestry work as for any other branch of agriculture.

Kentucky

The fire situation had already assumed serious aspect in certain parts of the State when rains and snows came along and put a stop to the fire danger for a brief period. Approximately March 15 about thirty patrolmen will be appointed in the Eastern part of the State in as many counties, and an additional district patrolman will be appointed. In addition to these appointments, two county forest protective associations in Bell and Harlan Counties, respectively, are in the process of organization. A similar cooperative association among the timber land owners of Rowan County is doing effective work. The County Forest Protective Association of Harlan County is contemplating an assessment of one cent per acre on its members for fire protective work. In view of this cooperation on the part of private timber holding companies with the office of the State Forester, it seems probable that the fire hazard will be greatly reduced during the year of 1914. At the Louisville Nursery the spring planting is under way and it is expected very materially to increase the capacity of this nursery.

The State Forester has been giving a series of six lectures on History of Forestry and Forest Policies at the State University at Lexington. This is the beginning of an effort to make forestry a live issue at the State University.

Pennsylvania

At the meeting of the Reservation Commission for March 15 new permanent camp sites were leased, bringing the total number of permanent camps leased upon State lands close to one hundred.

A new house for the forester of the Rothrock Forest in Mifflin County, and a new house for

one of our rangers on the Seven Mountain Forest in Centre County, were authorized.

During the months of January and February the receipts from the sale of material from the State Forests have amounted to almost \$3,900.

Louisiana

The Conservation Commission of Louisiana is making a special effort to prevent forest fires and is calling attention to the laws making it a misdemeanor, punishable by fine and imprisonment, negligently or wilfully to set on fire or cause to be set on fire any forest, brush or grass lands. The Commission urges the sheriffs and other parish officials and the officers of railroads and lumber companies to cooperate with the conservation agents throughout the State in preventing, and, if necessary, in punishing violators of the law.

The Commission considers the application of laws on this subject a matter of vital importance, and is using every means possible of acquainting the public with the laws on the subject and securing their enforcement.

Massachusetts

The Massachusetts Forestry Association has been working several years to obtain a slash law which would be workable in Massachusetts and at last, with the cooperation of other organizations, it has succeeded. This law is not all that might be desired in this section but it is a long step in the right direction. The law provides as follows:

Section 1. Every owner, tenant or occupant of land, and every owner of stumpage, who cuts or permits the cutting of wood or timber on woodland owned or occupied by him or on which he has acquired stumpage by purchase or otherwise, and which borders upon the woodland of another or upon a highway or railroad location, shall clear the land of the slash and brush wood then and there resulting from such cutting for such distance, not exceeding forty feet, from the woodland of such other person, highway or railroad location as the local forest warden shall determine, and within such time and in such manner as he shall determine.

Section 2. Any person who cuts or causes to be cut trees or bushes or undergrowth within the limits of any highway or public road, shall dispose of the slash and brush wood then and there resulting from such cutting within such time and in such manner as the forest warden of the city or town wherein such cutting is done shall determine.

Section 3. Whoever neglects to comply with the directions of the forest warden with regard to the disposal of slash and brush, as provided in Sections one and two of this act, may be punished by a fine of not less than five dollars nor more than fifty dollars.

Section 4. This act shall take effect on the first day of January in the year nineteen hundred and fifteen. (Approved February 25, 1914.)

It will be noticed that the local fire warden is the officer named to enforce this law. It would seem that in some cases this may not be very effective, but with our present State fire protective system, with a State fire warden and several efficient deputies who are constantly travelling over the State, that these wardens will be instructed and requested to do their duty. With this fact in view, it is felt that the law will bring very satisfactory results in this State.

North Carolina

The Forestry Club of Tryon, Polk County, North Carolina, was organized last fall and is now in very active operation. This association arose out of the very pressing need of fire protection in that county. Forest fires during November in western Polk County were the worst ever recorded. It was estimated that in four townships, 28,000 acres of hardwood land were burned over, causing a loss of \$3,000 to \$4,000 to property exclusive of the injury to timber and young growth. This latter damage was estimated by one man on the ground at \$60,000, which certainly is a very conservative estimate. The people of the county were so stirred up over the necessity of taking some action to prevent a recurrence of such destructive fires that the Forestry Club was organized. Mr. E. R. Rankin was elected president, and G. B. Cobb, secretary, while C. M. Howes was appointed fire warden. The club has already offered a reward of \$50 through the county commissioners for the arrest and conviction of any person who sets fires in the woods contrary to law. It has also prepared and distributed handbills on which are printed the State laws against setting fires.

The annual meeting of the State Forestry Association, which is to be held in Asheville April 8th, 9th and 10th, promises to be the most interesting and largely attended of any similar meeting held in the State. The American Forestry Association will be represented and several men of national reputation are amongst the speakers. Governor Locke Craig, Mr. Overton W. Price, Vice-President of the National Conservation Association, and Mr. W. B. Townsend, Townsend, Tenn., have all promised to make addresses, while Mr. H. S. Graves, U. S. Forester, and Congressman John H. Small, have also signified their intention of being present and taking part in the proceedings. An extra day has been added in order to provide for a trip into Pisgah Forest where logging is now going on in mountain hardwoods under strict and yet reasonable forestry regulations. An alternative trip for this day (April 10) has been arranged to the large pulp factory of the Champion Fibre Company at Canton, N. C. These, with the trips to the forest plantations of the Biltmore Estate, and the spruce forests on the slopes of Mt. Mitchell, make this an unexampled opportunity to become thoroughly acquainted with the southern Appalachian forests and with the practical methods for their management.

New York

In 1908 the New York Central Railroad caused fires which burned over some State land in Adirondacks and destroyed a quantity of forest area. Two actions were brought to recover damages. In each case an award for the full value of all of the material, injury to soil, etc., was awarded the State.

The railroad company demurred on the ground that timber upon State land was without value because the Constitution prohibited its removal. They also further argued that the measure of damage was ascertained by the value of the property before the fire, less whatever salvage might be derived, the State claiming that the Constitution prohibited removal of timber, there could be no salvage and, therefore, the loss was entire. The Appellate Division Court of New York State has just handed down a decision confirming the judgment of the Supreme Court in the previous case. The Railroad Company will doubtless make an appeal to the Court of Appeals.

In 1908, at the time these injuries were caused, the State did not prescribe any penalty, nor more than actual damage. Since that time a law has been enacted which prescribes a penalty of ten dollars for trees killed upon State land, and a penalty of one dollar for trees killed upon private land, together with damages.

New Jersey

Good advice relative to Arbor Day observances is given in a circular issued by the Forest Commission and the Department of Public Instruction of New Jersey. Arbor Day is to be April 10. The circular says: "Tree planting, though important, has been somewhat overdone in connection with Arbor Day observances. If there is room for more trees on the grounds of any school, or in nearby parks, let the occasion be used for planting with appropriate ceremonies, but it often will be better to organize a squad of pupils to cultivate and fertilize the ground about trees already established, to provide and maintain suitable guards, to conduct a campaign against insects, or in some other way to awaken a *continuing interest* on behalf of trees. It is well to keep in touch with the town or city shade tree commission.

"In this State there is no dearth of forests; in some places we have too much woodland. The exercises in country schools, therefore, may serve to give emphasis to local needs and interests, especially to the control of forest fires by which so much property is lost. There is a forest fire warden in every part of the State where there is danger of forest fires. He may be asked to take part in the exercises and point out how the pupils can help in this work. They can do much."

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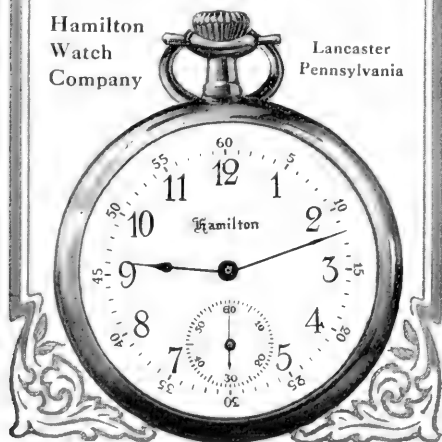
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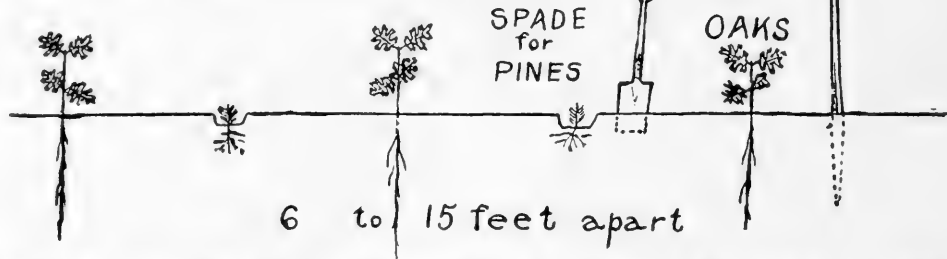
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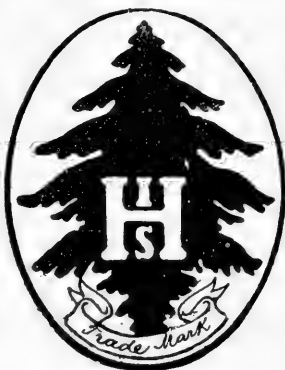
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American Forestry

Including American Conservation, acquired in August, 1911

Vol. 20

MAY, 1914

No. 5

16,000 MILES OF FORESTED SHORE LINE

WHAT IS A SHADE TREE WORTH?

THE GRAND COULEE

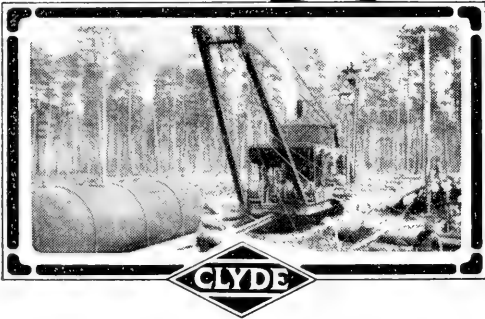
FORESTRY ON THE COUNTRY ESTATE

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The Magazine of the American Forestry Association

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May	CONTENTS	1914
-----	----------	------

16,000 MILES OF FORESTED SHORE LINE—By E. A. Sterling.....	319
With nineteen illustrations.	
THE ASSOCIATION'S EXHIBIT.....	341
WHAT IS A SHADE TREE WORTH?.....	341
SAVE THIS FOREST LAND.....	342
STATE FOREST AS A GAME PRESERVE—By Ernest O. Buhler.....	343
With two illustrations.	
EXAMPLE OF FIRE PROTECTION—By Jack Guyton.....	344
THE GRAND COULEE—By Winthrop P. Haynes.....	346
With five illustrations.	
SPRING SEEDING OPERATION.....	355
FORESTRY ON THE COUNTRY ESTATE—By Warren H. Miller.....	356
With nine illustrations.	
MANY USES OF THE FORESTS.....	365
YELLOW POPLAR PROFITABLE.....	366
With six illustrations.	
BETTER FOREST FIRE LAW—By William R. Fisher.....	370
WARNINGS AGAINST FIRES.....	371
HOW WOULD YOU DO IT?.....	372
With three illustrations.	
THE FOREST PRODUCTS EXPOSITION.....	375
GAME AND FISH INCREASE—By Prof. D. Lange.....	376
THE SOUTH'S FORESTRY AND WATER RESOURCES—By Henry S. Graves....	377
WHITE MOUNTAIN WINTER WORK.....	380
LODGEPOLE PINE FOR POLES.....	381
EDITORIAL	382
FOREST NOTES	384
STATE NEWS	386
CURRENT LITERATURE	388

AMERICAN FORESTRY is published monthly by the American Forestry Association.
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Declaration of Principles and Policy of the American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies:

FEDERAL ADMINISTRATION AND MANAGEMENT of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

STATE ACTIVITY by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.

FOREST FIRE PROTECTION by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

FOREST PLANTING by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

FOREST TAXATION REFORMS removing unjust burdens from owners of growing timber.

CLOSER UTILIZATION in logging and manufacturing without loss to owner; aid to lumbermen in achieving this.

CUTTING OF MATURE TIMBER where and as the domestic market demands it, except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.

EQUAL PROTECTION to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

CLASSIFICATION by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

American Forestry

VOL XX

MAY, 1914

No. 5

16,000 MILES OF FORESTED SHORE LINE

By E. A. STERLING

THE steamer on the Vancouver-Prince Rupert run covers about 550 miles. *In this same distance there are about 16,000 miles of forested coast line* on the two shores and around the islands of the inside channels. This is a distance appreciable only by comparison. If connected and straightened out it would give a shore line of magnificent forests and mountains two-thirds of the way around the world, or from New York via Cape Horn, past New Zealand and Australia and almost to the Cape of Good Hope, South Africa.

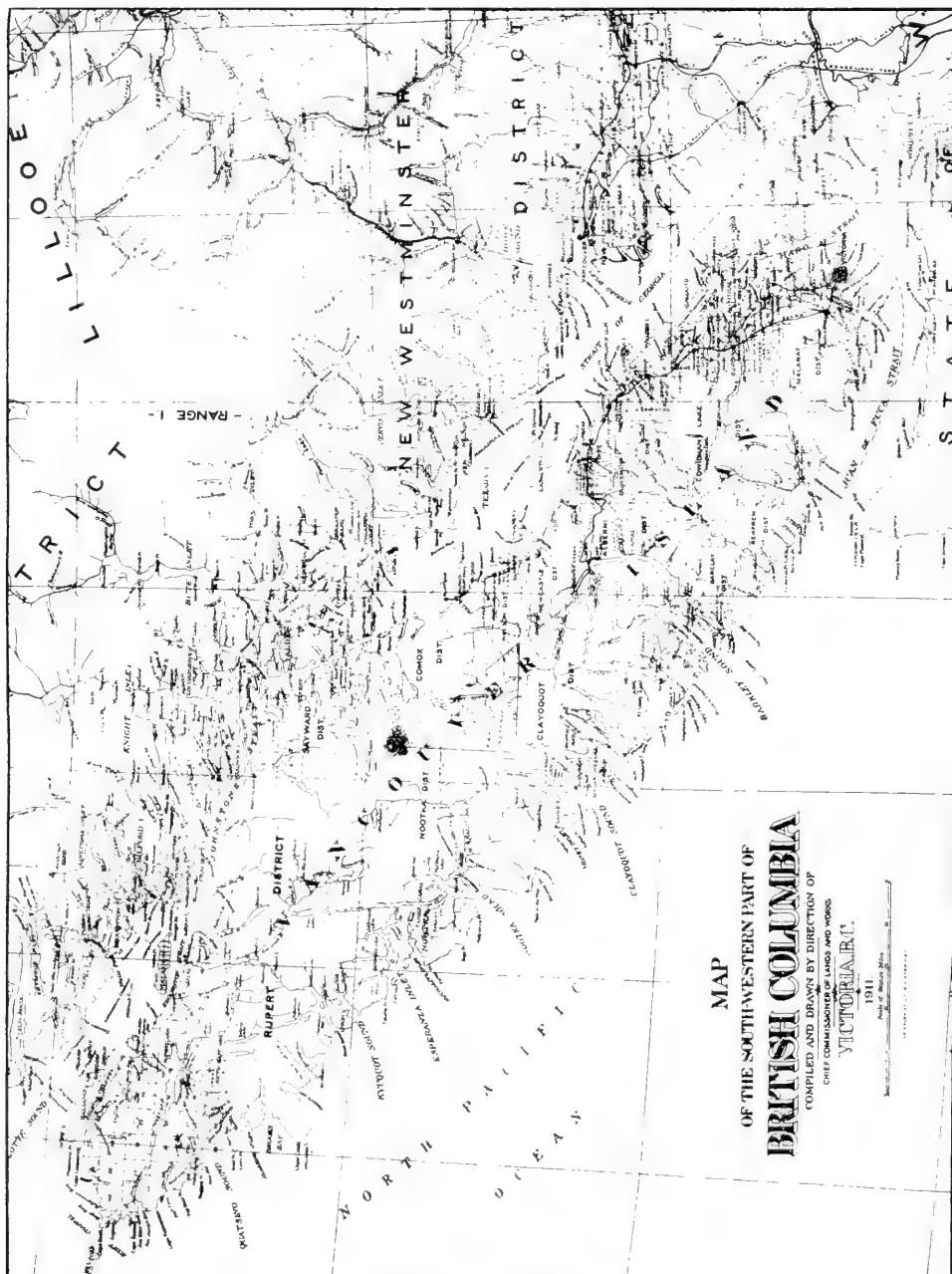
The passenger from the deck of an Alaska or Prince Rupert steamer on the inside route sees on this coast line a panorama of mountains and forests unequalled on any regular water course in the whole world. From the time the steamer swings out through the narrow entrance of Vancouver Harbor and on past Point Atkinson into the Strait of Georgia, a sky line of mountains and indented shores breaks the view on every side. A hundred miles north of Vancouver the wide sweep of water narrows into tide swept channels, and for 120 miles until Queen Charlotte Sound is reached, the ship is navigated through passages which might be enormous salt water rivers, except that now and then the channels widen or a Sound or Inlet gives a vista of miles of connecting water running back into the west slopes of the Cascade Mountains.

On one side the shore of Vancouver Island rises abruptly to a mountain chain of 3,000 to 5,000 feet, along the foot of which the boat passes; while

on the east is a broken shore line with thousands of large and small islands, and an intricate system of protected channels extending far back into the mainland. The far background is a wilderness of jagged mountains with ever-present snow-capped peaks and here and there the green hue of glacial ice. In the middle foreground of the shores the forests uniformly cover the lower slopes, save where the logging camps have taken their commercial toll. Evidences of man or civilization exist only in the occasional camps of loggers, salmon canneries and the Indian villages.

If the tourist from an ocean-going steamer on the regular course sees all this, and more, what is revealed to the cruising launch which threads the narrow channels and inside passages off the regular route? The steamer view shows an unparalleled view of mountains and glaciers, with the pointed, overhanging of Mt. Stephens peak a striking landmark; the independent cruising party sails at will through the unfrequented waters, and back fifty to one hundred miles up deep water inlets into the very heart of the mountains, and along the foot of the peaks and glaciers, as on Kingcome Inlet, which comprise the units of the distant view.

The tourist compares the west coast of British Columbia with the fjords of Norway; but anyone who gets the intimate view, attempts no comparisons, since the knowledge is given that no such magnificent combination of water and shore exists anywhere. To complete the picture, imagine a region



MAP
OF THE SOUTHWESTERN PART OF
BRITISH COLUMBIA
COMPILED AND DRAWN BY DIRECTION OF
CHIEF COMMISSIONER OF LANDS AND MINES
VICTORIA B.C.
1911

Scale: 1 inch = 10 miles
1:62,500
Published by the
Geological Survey of Canada



Photo by E. A. Sterling.

HOME OF A PROUD NIMKISH CHIEF.

NOTE THE SIGN OVER THE DOOR OF THIS CHIEF'S HOUSE, ALSO THE TOTEM PAINTED ON THE SIGN. ANOTHER CHIEF IN THE SAME VILLAGE HAD A SIGN READING:

CHIEF JOHN CLARK

OF TIAWSIS GAVE A FEAST.

1,130 SACKS OF FLOUR—COST \$2,260.00

SEPTEMBER 18TH, 1911

where your cruising launch can nose its way half a dozen times a day into Sounds and Inlets where you have a water setting comparable to the Lake of Lucerne with a Riga above every headland. And if you miss the art and history developed by the people of the Swiss Mountains, remember that you can go ashore in colonnades of trees which were fully mature when the old bridge at Lucerne was built, and more beautiful than any cathedral; and in the Indian Villages find traits and customs unchanged from the time of the Lake dwellers of Como.

The Indians of the British Columbia coast are known generally as Siwash. Actually the term Siwash is not a tribal name, but a term of derision in the Chinook jargon. The traits which give rise to the name probably resulted in part from contact with the whites, although most of the tribes were never highly developed. There are 188 bands or tribes of Indians in British Columbia, with a total population of about 25,000,

of which a large per cent live on or adjacent to the coast.

These various bands are under the charge of regional government agencies, and under each agency are several bands. For example the Kwawkwalth Agency at Alert Bay has charge of Kwashela, Nimkish, Tsawataineuk and Mamalilikulla and various other bands, all belonging to the Kwawkwalth or Lachwiltach Nations. The population of these various bands varies from a dozen or two up to two or three hundred individuals.

While some of the old Indian traditions and customs are dying out, most of the tribes keep up some form of the potlach, which in the native tongue "Palth-piah" means the distribution of gifts. For example, "potlach conway sun nisika muck-a-muck," is a Chinook version of "Give us this day our daily bread," in the Lord's prayer. At the same time like most Chinook words it has a host of meanings which cover carnivals, feasts, meetings for trade and

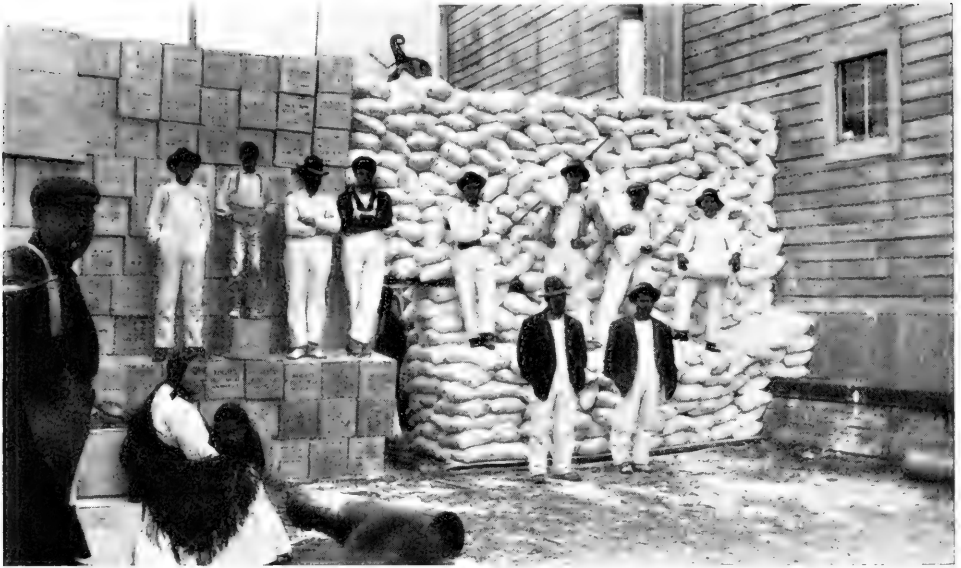


Photo by D. C. A. Galarneau.

SUPPLIES FOR A POTLACH.

ON THE LEFT ARE DOZENS OF BOXES OF SEA BISCUIT AND ON THE RIGHT SCORES OF BAGS OF FLOUR. THESE WERE ALL DISTRIBUTED AMONG THE INDIANS AT A POTLACH GIVEN AT ALERT BAY, BRITISH COLUMBIA.

barter, and the various ramifications of the potlach.

The gifts at these "potlachs" consist of money, blankets, dishes, calicos and other articles and the amount of material given away at some of these carnivals is enormous. According to the lettered sign of Chief John Clark of Tiawsis a feast occurred at which 1,130 sacks of flour costing \$2,260 were used. Naturally the Indians will travel long distances to attend a potlach, and enjoy the dancing and singing as well as the gifts. The Kwawkewlth tribes probably rank first in the frequency and the extent of these festivals.

The "potlach" houses, which are large, barnlike structures built of cedar, may best be described as community affairs where the Indians trade, feast, frolic and entertain their friends. The houses are usually occupied between the ceremonies by poor Indian families who appropriate space wherever they can find it, making them free hotels in which they build open fires for warmth and for cooking, and to which they bring their food, blankets and fleas. The latter are permanent inhabitants of all these places.

The principal art of the Indians is wood working, and a high degree of imaginative skill is shown in their totem poles. These poles are emblems or tokens of clans or of families and have no particular religious significance. While the Indians are proud of them it is the same sort of pride and reverence a family might have for its coat of arms, or family crest.

The poles are colored and often very cleverly, the predominant colors being red, yellow, green and black. Their size and form depend entirely upon the caprice of the man who makes them.

The native boats are really works of art, and from the war canoes 30 feet or more long, to the delicately carved lighter canoes, which seat only two or three, a balance and symmetry unattainable by white men is the rule. All these boats are dugouts that are carved from a single cedar log, but so well is it done that many of the canoes are light and fast, and beautifully embellished at bow and stern.

The burial customs are unique, the chiefs and leading men being buried usually on little islands with quaintly carved totems and headboards; while

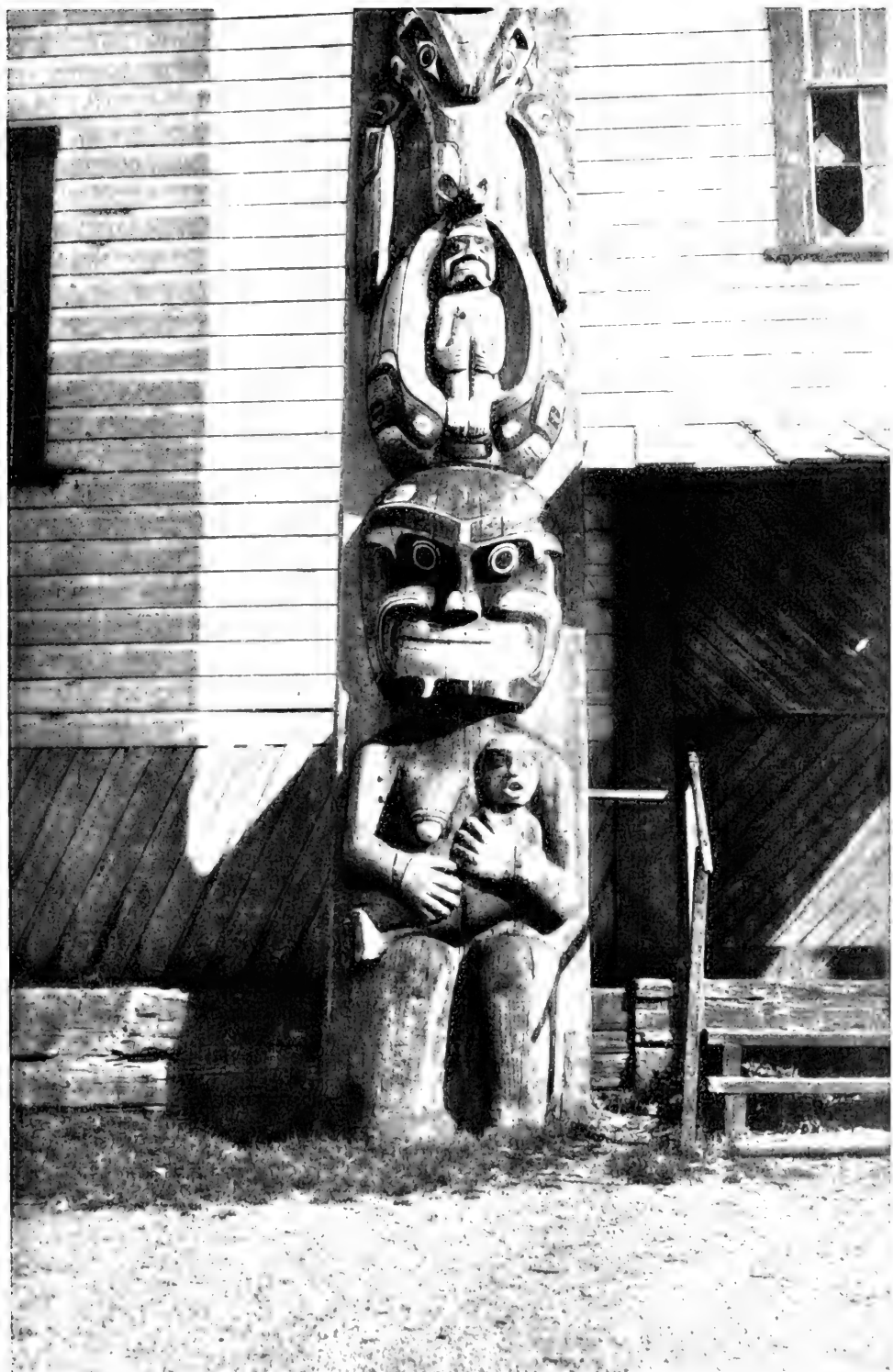


Photo by E. A. Sterling.

A TYPICAL SIWASH TOTEM.

Note the great care given to detail in the carving of the large and small figures and in the decorative work at the top of the pole. These totems made by the Nimkish band of the Kwaxkwilth nation excel in beauty and workmanship the work of the Alaska Indians.

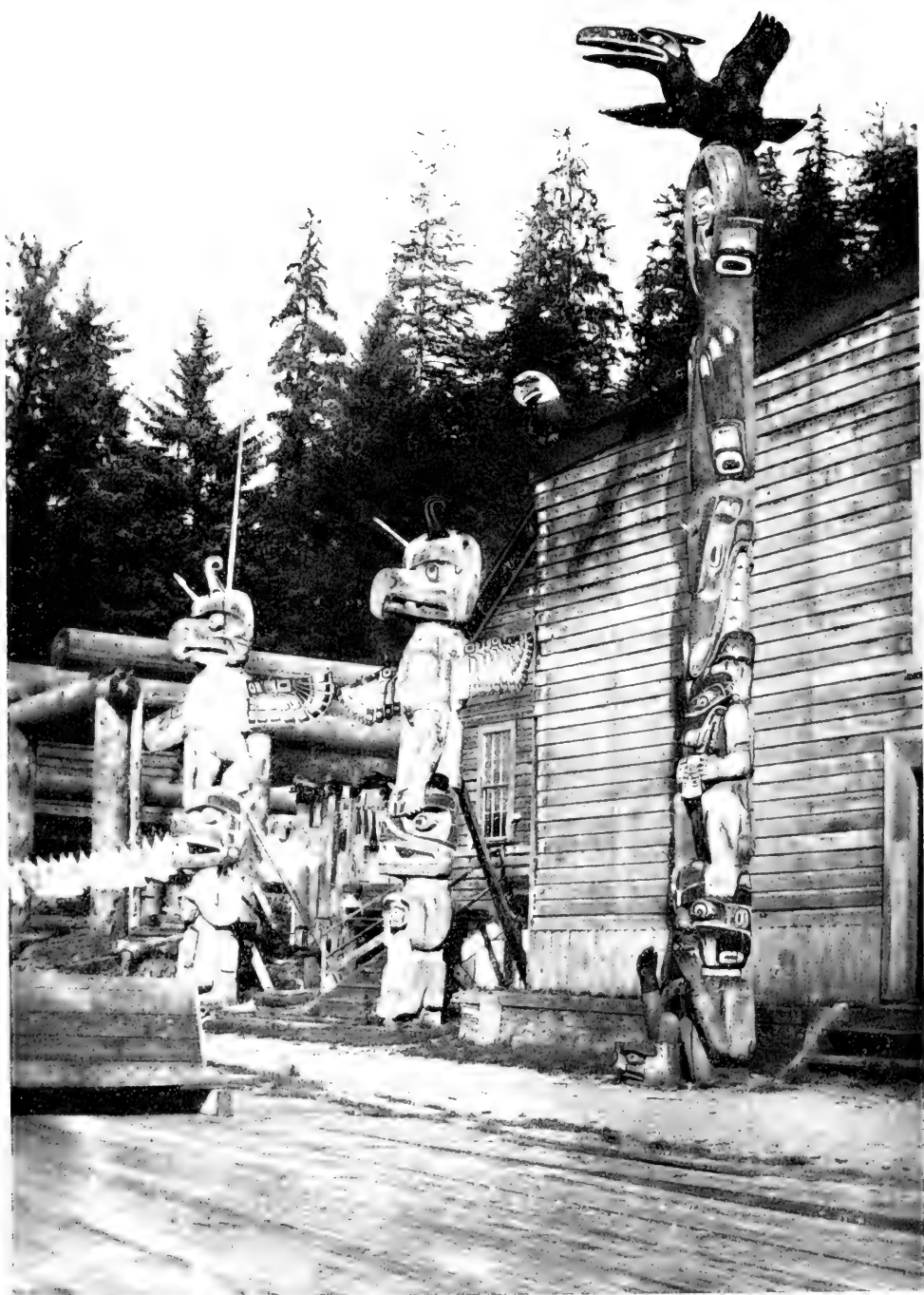


Photo by E. A. Sterling.

AN ELABORATE TOTEM.

The variety expressed in these figures is worthy of particular attention. Note the head at the foot of the nearest pole and the hooded head at the top surmounted by the fantastic bird. All these poles are made of cedar.



Photo by C. A. Lyford.

A FULL LENGTH TOTEM.

This is a quite unusual full length totem of a human figure, the usual totem being a series of figures. It is about eighteen feet high and a good idea of the size may be gained from the six-foot man standing beside the left leg. The lines on the forehead, cheeks, ears, eyes, mouth and finger tips are white, giving a strikingly grotesque appearance. This totem, the only one of the kind seen in B. C., is in the Tsawataineuk village of Gwayasdums.



Photo by E. A. Sterling.

A SIWASH DUG OUT.

Some of the British Columbia Indians are very skillful in the making of these "dug out" canoes, far excelling the white men. The canoes are light and graceful as may be seen. This one is manned by two Indian boys and can travel fast.

the lesser lights are laid to rest in a rude box tied fast to a limb high in the top of a nearby tree. In an isolated winter village of about 350 inhabitants on a little island near Fife Sound the trees back of the village are thickly laden with the rude burial cairns. Fish of various kinds largely constitute the Indians' diet, and at the same village the strip of beach is strewn with shells of clams which have been brought in until it looks like a natural shell beach.

As government wards, the Siwash are a race on which either pity or admiration would be wasted. They are well suited to their environment, and the British Columbia coast is something of a Paradise for the Indian temperament. They can hunt and fish in any season of the year, work in the canneries or logging camps if they feel like it and do not have to plan for any radical change in seasons. Their attire reflects the prosperity, age and tastes of the wearer, ranging down through various stages of overalls, calicos and blankets, to the old squaw with a dirty single garment, blanket, and bare feet. The young Indians are often seen

proudly and uncomfortably attired in the latest styles of ready-made clothes, with the accompaniment of shiny yellow shoes, white collars and other adjuncts of civilized man.

Some of the Indians are at times really very prosperous, their cash assets being derived from high pay as guides, or the more nominal wages of the salmon canneries; while a particularly energetic individual will sometimes appear in town with \$1,000 to \$3,000 in cash as the result of having sold a boom of hand logged timber. As a rule, however, they are poor more hours than they are rich. Naturally they do not know how to make the best use of their money when they get it, but they spend it according to the best light they have, which usually means that it goes for "jim-cracks" or a lot of first class material which they really do not need.

A well-known forest engineer in Vancouver relates his experience in spending an evening at one of the Indian homes at Thunder Bay. Apparently the family had recently passed through a temporary period of prosperity, for the visitor was interested to see stacked up

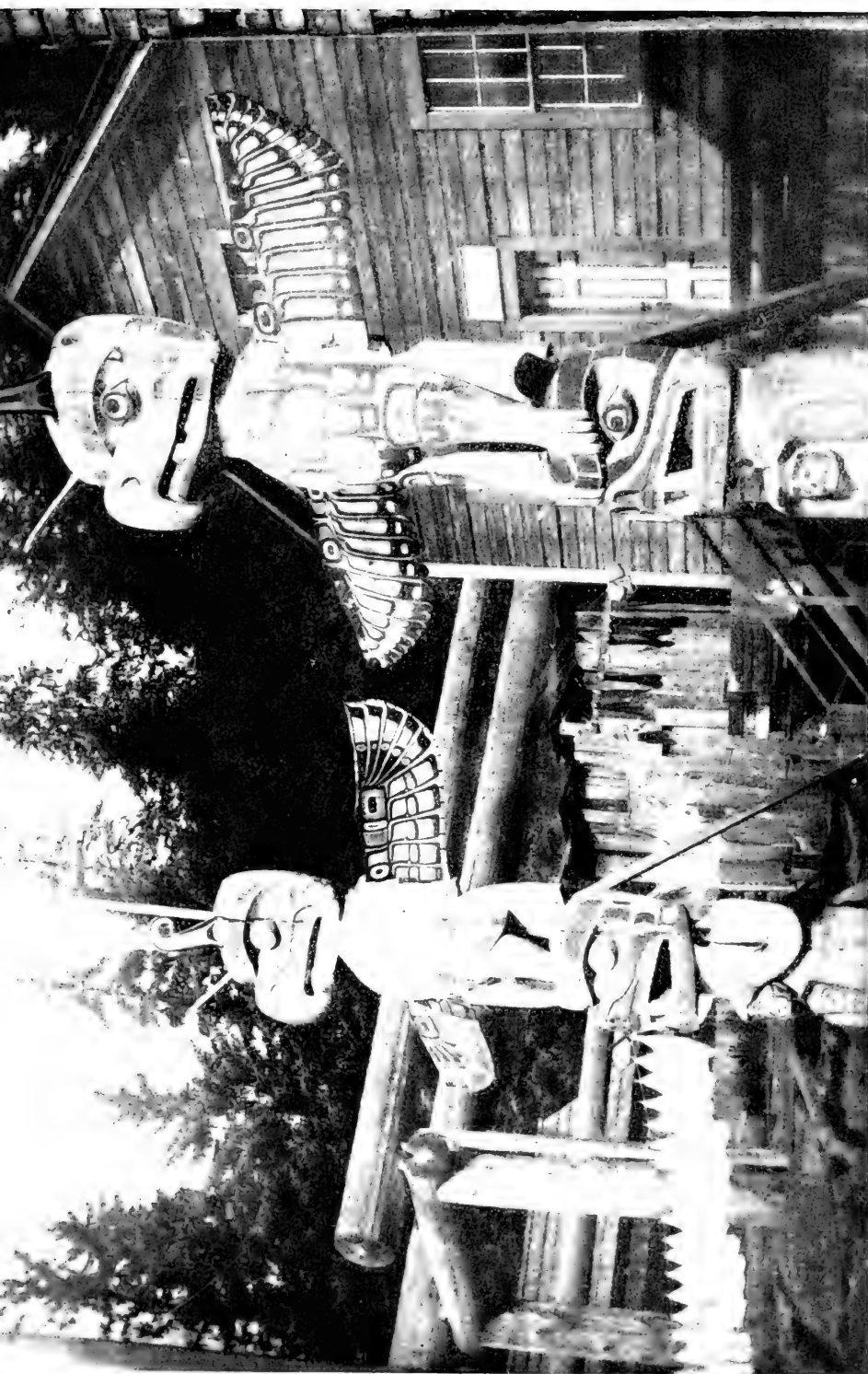


Photo by E. A. S. L. L. L.

TOTEMS AT ALERU BAY, B. C.

THESE TOTEMS ARE ERRECTED IN FRONT OF THE HOUSE OF A TRIBAL CHIEF WHOSE NAME IS PROMINENTLY DISPLAYED ON A SIGN ABOVE HIS DOOR. ON THE LEFT IS THE FRAME OF A POULCH HOUSE. THE CLOTHES LINE AT THE LEFT DOES NOT HOLD THE FAMILY WASH, BUT FISH HUNG OUT TO DRY



Photo by D. C. A. Galarneau.

DUG OUT MADE BY WHITE MEN.

TIMBER CRUISERS USING A RED CEDAR "DUG OUT" MADE BY WHITE MEN. IT IS HEAVY AND CLUMSY COMPARED WITH THE DUG OUTS MADE BY THE INDIANS, WHO ARE ADEPTS IN WOOD CARVING, EVEN WITH THEIR CRUDE TOOLS.

at one end of the room 40 pairs of trousers and as many coats, shirts and other articles of wearing apparel, and miscellaneous clothing without end. The collection also included dozens of crates of oranges, canned fruits and vegetables, several phonographs and a fine \$85 steel range which they used for a sideboard. Yet with all this luxury they cooked their food over an open fire inside the house and slept in quilts and blankets wherever they could find an odd place to lay them down at one end of the room.

The forests flanking the 16,000 miles of coast line are the most valuable resource of the region. The fish, game, minerals and scenery are resources of great interest and value; but the timber, under present developments, is a greater asset than all the others combined. The salmon canneries represent a well-established industry; mining is carried on in the region, but is not a ranking industry on the coast; while the game and scenery are not sought for themselves alone. Some day a steamship company may make capital of this scenic coast line, and Bute Inlet and Wakeman Sound be-

come as well known as Lake Louise or Banff, while with the increase in population in the Northwest, the inside channels of British Columbia may become a mecca for motor boat cruising, with summer houses on the coast and islands. Whatever the ultimate developments, the next decade at least will be a period of timber exploitation on an enormous scale and under fundamentally favorable conditions.

The west coast of British Columbia is an enormous natural forest region where the favorable conditions for growth have produced dense forests of valuable species at once protected from the winds of the Pacific, and immediately accessible to tide water. The heavy rainfall of from 60 to 120 inches annually is a decided factor in producing the large individual trees in heavy stands, and at the same time has prevented wide destruction by fire. Another factor which has favored timber growth and prevented fire is the proximity of the warm Japan current, which causes heavy fog during parts of the year. This "Queen Charlotte fog belt" extends over a large section of

the coast timber country, and keeps some of the best timber protected in a blanket of moisture, as are the red-woods on the California coast. The coast region is almost entirely non-agricultural, and should be kept under forest cover. This is fortunately a future likely to be realized under the Provincial policy of fire protection, aided by the heavy rainfall and the tendency of valuable species to reproduce naturally on cut over land.

The predominating commercial species of the coast forest are Douglas fir, red cedar, hemlock, balsam and spruce. The estimate of the timber in British Columbia is 250 to 300 billion feet, of which a large percentage of the best and most accessible is on or adjacent to the coast. The Province of British Columbia derives a large part of its revenue from its forests; the amount collected in 1913 from royalties, license fees and other sources amounting to nearly \$3,000,000, or an average of approximately \$7 for every inhabitant of the Province. Of this about \$245,000 was used during the same year by the Forest Branch for the management and protection of the forests, the heaviest

expenditures for fire protection being in the mountain districts. Government launches and their crews maintain a fire prevention and police patrol on the 16,000 miles of forested shore lines.

While these shores appear to be heavily forested, an entirely wrong impression of the uniform value and similar character of the forests is derived from casual observation by travelers, or even by timbermen who draw their conclusions from a boat trip. The forest cover is practically complete and fairly uniform, but a large amount of the timber is not of merchantable value under present market conditions, nor likely to be, until the better timber equally accessible is exhausted. The timber of value for present logging, or to hold as an investment, does not cover the whole shore line, but lies in the protected "draws" or valley bottoms where little streams break into the "salt chuck," or on moist slopes. The investor who buys timber limits just because they have trees on them is in for a long wait or an unhappy awakening. It is very unsafe to "cruise" British Columbia timber from a boat.

Startling as it may seem, *probably not*



Photo by E. A. Sterling.

BRITISH COLUMBIA COAST SCENE.

THIS IS A TYPICAL VIEW IN ONE OF THE NUMEROUS INSIDE CHANNELS AMONG THE ISLANDS ALONG THE COAST OF BRITISH COLUMBIA.

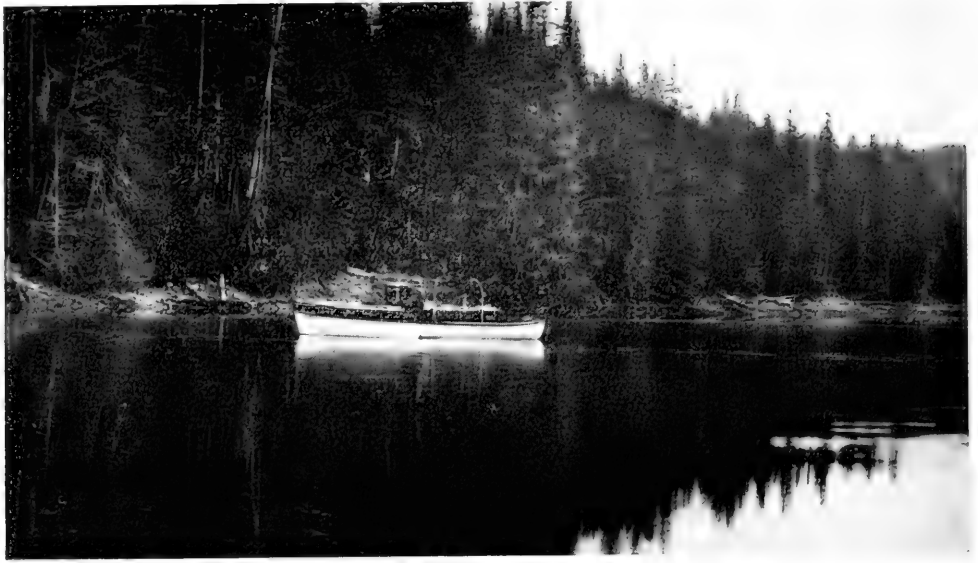


Photo by E. A. Sterling.

WHAT A FORESTER NEEDS HERE.

IN CRUISING TIMBER IN THE COAST DISTRICT OF BRITISH COLUMBIA A LAUNCH IS ABSOLUTELY ESSENTIAL AND IT MUST BE SEAWORTHY. HERE IS SHOWN A FORESTER'S LAUNCH AT ANCHOR IN THE PROTECTED WATERS OF A LAGOON.

over 10 billion feet of British Columbia's 300 billion feet of timber is of high grade and immediately accessible to tide water. Since timber of this character, available for cheap logging and water transportation is in greatest demand, it is also of highest value. By the same token, such timber so long as available becomes a basis of values, and since it can be logged cheaply keeps the price of manufactured lumber at low levels. This condition, however, cannot last long, since the quantity of such timber is so distinctly limited. Part of it is being cut each year and part held for better prices. Gradually the supply of logs has to come from farther north, or farther inland, and from land not quite so cheaply logged, so that while the quantity may be as good, the costs of production generally are rising, and thereby increasing the stumpage value of the high-grade tide-water timber still uncut.

The kind and character of the timber varies considerably in the coast region. Douglas spruce for about 100 miles north of Vancouver is the most abundant species, and in greatest demand and of highest value. It reaches magnificent proportions in individual trees,

the larger specimens often measuring 8 to 10 feet in diameter, with a volume of 15,000 feet or over per tree.

North of the region where Douglas spruce is predominant is an enormous stretch of inside water and shore lines known as the "cedar country." Here occurs red cedar in its optimum development. In favorable locations are found stands of cedar made up of trees from 4 to 10 feet in diameter, of the finest quality, and in quantity occasionally running over 100,000 feet to the acre on considerable areas. Over many square miles cedar will comprise 50 to 80% of the stand.

Red cedar ranks with southern cypress as the "wood eternal." Perfectly sound logs are taken from fallen trees, which are known by the age of trees growing over them to have lain in the wood for a hundred years and more. Since the wood is very resistant to decay, cedar is widely used for poles and shingles. It is also an excellent building material where great strength is not required, and in texture and firmness of grain is almost unequalled.

Alone or associated with other species on the whole west coast is found



Photo by C. A. Lister.

THE WRITER OF THIS ARTICLE AT THE FOOT OF A RED CEDAR.

Photographs give inadequate conception of the character of the forests. The actual ground level was several feet below the apparent base of the tree, and the thick undergrowth made it difficult to get a clear view. So dense is the forest cover that it is necessary to give one to one and one-half minutes exposure for a picture.



Photo by E. A. Sterling.

OVER 20,000 BOARD FEET IN THIS.

THIS MAGNIFICENT PRODUCT OF THE FOREST, WHOSE DIAMETER IS ABOUT NINE FEET, IS A DOUGLAS FIR. MANY SUCH TREES WILL CUT 10,000 TO 20,000 BOARD FEET. THE ROUGH ROOT-LIKE GROWTH IN THE TRUNK IS NOT PART OF THE TREE.

spruce, hemlock and balsam. Spruce is the least abundant, but of the highest value of the three. The other two are woods of the future, the present market absorbing only limited quantities of the lumber. This, however, is only because of the abundance of other woods which received earlier recognition. The western hemlock is far superior to the eastern species and suitable for many purposes as construction material, while balsam, although less strong, is equal in other respects and has the advantage of lighter color and more uniform texture. Both balsam and hemlock are extensively utilized in making paper pulp, and while their present lumber value is

not great, their low stumpage value makes them an attractive and promising investment. A \$5,000,000 paper mill at Powell River, with a capacity of 225 tons of paper per day, uses spruce and hemlock almost exclusively for pulp. They also use considerable balsam and like it.

Logging on this entire stretch of coast line is naturally one of the largest and most interesting phases of the timber exploitation in the region. Its beginning was near the early centers of settlement, and it is now developed and extended far up the coast. In advance of the present operations were the "hand loggers," a peculiar development



Photo by E. A. Sterling.

BRITISH COLUMBIA DOUGLAS FIR.

DOUGLAS FIR IS ONE OF THE MOST VALUABLE WOODS IN BRITISH COLUMBIA. THIS STAND IS IN A MIXED FOREST OF DOUGLAS FIR, HEMLOCK AND BALSAM.

of local land laws and markets. In a word, under the earlier laws any citizen of the Province could take out a license for hand logging, which gave permission to log on a stated area which was always immediately adjacent to tidewater. The provisions of the permit were that no steam machinery should be used. The payment for this permit was only a few dollars, and the result was that many men in pairs or small camps operated close to the shore line, felling the larger and better trees, and by an amount of labor and skill almost incredible, slowly worked the logs down into the "salt chuck." These would ultimately be assembled into booms and towed to the mill. The result is that the shore line is scarred for miles by the work of these hand loggers, but under present market conditions the land can be logged over again, while the strip operated on is so narrow that it really has little effect on the value of a timber limit.

Present logging operations on tidewater limits are conducted almost entirely with heavy equipment which consists of a "bull" donkey located on the shore line with a skid road running back a convenient gully or ravine for 1,200 to 3,000 feet or more. Smaller skidding donkeys mounted on heavy frames pull themselves through the woods and after the trees are felled, skid the logs to the main road where they are hauled by steel cables to tidewater by the larger donkey at the shore. The size of the logs and the rough nature of the ground prevents the use of draft animals or the lighter equipment seen in the south and east. The logs are assembled in protected coves or bays and made up into booms which are then towed by large tugs to the sawmills at Vancouver, New Westminster and other points. The charges for towing vary with the distance. The present logging rates range from 75 cents a thousand to as high as \$2.50 from Seymour Inlet, which is 250 miles from Vancouver. The towing charge for most of the inside channel country is from \$1.00 to \$1.50 per thousand. In the coast district logging and towing can be carried on the year round, although usually most of the camps shut

down during the winter season, which is the period when it rains a little harder, if possible, than during the spring and summer. There is, however, little or no snow.

The booming of logs in the coast district of British Columbia is an intensely interesting phase of the lumber industry. The usual type of boom is made up of 8 to 12 sections or "swifters," each section being made of boom sticks 64 feet long and a top diameter of 12 to 16 inches fastened together with heavy chains. Having secured the boom sticks together, they are placed in two parallel lines and the logs floated in and arranged endwise, packing them as closely as possible to the desired width of the boom, which varies from 60 to 100 feet. Care is taken to place comparatively long logs next to the boom sticks where they are joined together. After filling the boom with logs, the boom sticks are drawn together by a winch or small donkey engine, and the binding poles or "swifters" to hold the boom from spreading, are placed in position and chained at each end to the boom sticks. A single section or "swifter" of a boom usually contains from 40 to 80 thousand feet log scale, and while 8 to 12 sections is the usual number, as high as 20 sections or over a million feet are sometimes made into one boom. Booms of this character are known as water section booms and their towing speed is from 2 to 2½ miles per hour, and frequently the larger tugs tow several booms. There is comparatively little loss to logs thus towed when navigating the waters between Vancouver Island and the mainland, but since a gale is a source of danger, it is usual for the captain to seek shelter upon indication of a storm. There is no particular period of gales or hurricanes, however.

Another form of boom which has come into favor is known as the Davis patent. Its essential features consist of arranging a sufficient number of long logs to make a width of 80 to 100 feet. These logs are then firmly bound together by a wire cable at each end. Other logs are then piled on top and as the weight increases, the raft forming the bottom



Photo by E. A. Sterling.

HEAVY STAND OF HEMLOCK AND BALSAM.

Trees with clear length of 200 feet, and stands of over 100,000 board feet per acre, are not uncommon in the forests of hemlock and balsam. The undergrowth is often luxurious as in a tropical forest. This particular stand is on a slope immediately adjacent to tide water.



PREPARING A BOOM.

HERE THE BIG LOGS ARE BEING ASSEMBLED AND WILL LATER BE MADE INTO A BOOM AND TOWED DOWN THE COAST TO THE SAW MILLS.

sinks. This process is continued until the logs form a rounded pile extending 10 or 12 feet above the water-line and for a considerable distance below. Cables are then passed over at each end from the outside log of the original raft to the corresponding log on the other side and firmly secured. The raft when finished resembles a great sheath of grain, except it is bound at both ends instead of the middle. From 400 to 800 thousand board feet can be towed in a single section of this kind and without danger of loss from storm. This form of rafting is especially valuable for hemlock, which shows a tendency to sink. If the front end of a hemlock log in a water section boom dips down ever so slightly when in motion, the downward thrust of the water will force it out of place, and after turning a somersault under the boom, it simply rolls out and is free.

The future of this great tidewater timber country, and, in fact, of all the British Columbia forest lands, is of particular interest to the forester and conservationist. Since so much of the

country is non-agricultural, it is fundamentally suited for continual forest production. Natural growth and controllable fire risk encourage this end. Such use of the territory assures not only a permanent asset to the Province, but a reserve timber supply which, because of its availability to water transportation, will be distributed among the markets of the world. The first step is the utilization of the existing forests since the trees are now over mature. The cutting will be incomplete and wasteful because the market permits utilization of only the best. Following this era of lumbering will come a long regeneration period, when the cut-over land, either naturally or with the help of man, will come back into forest. The second and successive forests will never equal the first because the market by then will not have the heritage of the trees centuries old to draw on, and will be content with smaller sizes and lower grades.

It is not without regret that these incomparable tidewater forests are consigned to the commercial needs of ad-



Photo by E. A. Sterling.

BRITISH COLUMBIA RED CEDAR.

THE TRUNKS OF THESE RED CEDARS ARE COVERED CHARACTERISTICALLY WITH MOSS. DESPITE THE ROUGH OUTSIDE APPEARANCE OF MANY OF THE CEDAR TREES, THEY PRODUCE LUMBER OF THE FINEST GRAIN AND TEXTURE.



Photo by E. A. Sterling.

NOW TIMBER—SOON TO BE PAPER.

A NINETY-FOOT HEMLOCK STICK ON ITS START THROUGH THE POWELL RIVER PULP AND PAPER MILL WHERE IT WILL BE CONVERTED INTO PAPER IN ROLLS FIFTEEN FEET WIDE.

vancing civilization from the new China and other countries of the Orient to the settlers of the Canadian West. Sentiment, however, will play little part and the greatest regret of foresters and lumbermen will be that the utilization cannot be more complete. It is inevitable, since the consumers demand only the best at the lowest price, that the producers can manufacture and market only the material on which there is a profit. On the British Columbia coast this means that the smaller and poorer timber is not used, and the lumbering methods are apparently wasteful while in reality that is only in keeping with economic conditions.

The forested coast district of Western British Columbia presents conditions in the way of land ownership and lumbering methods which practically preclude any possibility of long time forest management by private owners. There are essentially three separate divisions of the lumber business into stumpage ownership and logging, manufacturing by sawmills, and the sale of lumber. In British Columbia the title

to most of the forest land is vested in the Government, the exceptions being certain grants which include both land and timber. Since forestry practice is absolutely contingent on the ownership of the land, it follows that the responsibility for the future forest production in the region rests with the Government. The individual or corporation acquires title to stumpage through timber licenses and the payment of an annual license fee. The stumpage owner may or may not be the logger, although the two, except in case of stumpage investment, usually go together. The manufacturer or sawmill man may have no interest whatever in the stumpage or the logging, and, in turn, may shunt the sales end of the business to separate organizations, although naturally the larger sawmill concerns have their own sales organization, and in some cases own stumpage. The essential point, however, is that the Government is the land owner, and, as such, has a tremendous responsibility in the development of a policy and practice which will eventually devote these lands to their best use



Photo by E. J. Stetson.

FRAME FOR A POTLACH HOUSE.

The logs are red cedar logs. The outside of the house will be of split cedar boards. The word "Potlach" in the Chinook jargon means "give," or the distribution of gifts at potlach gatherings, but as applied to the "potlach houses," is practically untranslatable. These houses are community affairs where trading is done, feasts given, etc. They are also used as residences by the poorer Indians, becoming free communal hotels.

—the production of successive forest crops.

The temporary or permanent inhabitants of these thousands of miles of forested shore line are almost exclusively interested in commercial developments. The region, however, cannot fail to make a deep impression; while the conditions are so varied, and the aspects so constantly changing, that even familiarity does not dull the attractions. The forest engineer, who was an entire stranger to the region less than ten years ago, has a variety of unique experiences entirely different from forest workers in any other section of the country.

Since there are practically no means of transportation except by water, the forester depends on his cruising launch for transportation, and as a camp in much of the survey and exploration work on tidewater limits. As part of the day's work, he may find himself in the long northern twilight cruising down an inside channel over quiet water which reflects the dark forested shore line in an endless variety of shades and colors, while in the far distance the snow-capped peaks may still reflect the full sunlight or the saffron tints of the Alpine glow. At night he may anchor in a sheltered cove, dark and silent, save for the many sounds of the sea and wilderness, or cruise on under the deceptive light of stars or moon which makes familiar landmarks like strange and unknown sights. Most wonderful of all is a night run in a heavy fog when the moon above the fog bank lights the restricted view of water with a weird and ghostly radiance, giving the constant impression that the boat is turning in a narrow circle.

While these inside channels are usually calm and peaceful, the launch may run out of the sunshine into a

driving squall or from some protected passage into a veritable maelstrom of "white water," caused by a "tide rip" or the equalizing flow of the tides through some narrow channel. The wind draws through some of the larger channels as through a chimney, and even moderate gales kick up a sea which means lashing everything fast and a round of pitching and rolling which is more spectacular than pleasant. On such occasions the quiet, protected cove may not be within reach, and as night shuts down, the launch is glad to creep into partial protection along the shore or behind a boom of logs where the back wash makes the anchor chain a creaking, grinding nightmare and the night a mystery of strange sounds through long hours of anxious watching.

The forester's launch on one particular night, when a gale of rain was driving up Clatham Channel, had found snug refuge in a little cove protected by a boom of logs. Sharing the same shelter was a small, low-powered launch owned by a couple of loggers, who came aboard late in the evening loaded with a strong nerve tonic in the form of "Canadian red rye." Despite warning of the danger they started their engine, and after a half hour's loud talking and maneuvering to get through the opening of the boom, put out into the driving gale and heavy sea of the main channel, with the brag that they would make their camp across Knight Inlet or drown. For a few minutes their light could be seen bobbing up and down, and then was gone in the rain and darkness. Whether they arrived or not the writer does not know, but probably they did, for something of their spirit, whether shown in wild recklessness or cool, sober judgment, has been a dominant factor in the development of this frontier coast.

No More Barbed Wire

Forest officers in Washington and Oregon plan to discontinue the use of barbed wire on their forests. This will affect their own pastures and public drift fences. They say barbed wire has no advantage over smooth wire, that it injures stock, and that it is more likely to be borne down by soft snow. Stockmen on the Ochoco forest, in Oregon, recently constructed drift fences of smooth wire, though with some misgivings; now they say they will never use barbed wire again.

THE ASSOCIATION'S EXHIBIT

MEMBERS of the American Forestry Association, their friends, and all who are interested in forestry, all who love trees whether in great forest areas, woodlands, country estates, the garden or the street, are invited to visit the exhibit of the Association at the Grand Central Palace, New York City, May 20 to 30, during which period the Forest Products Exposition will be held.

This will be the same exhibit which the Association had at the Exposition in Chicago from May 1 to May 10 and which thousands of Chicagoans and others visited. Attendants will explain the work of the Association and distribute literature as well as tell of the value of the great educational work the Association is doing. The chief feature is the display of photographs showing

different phases of forestry, the cutting, logging, and marketing of mature trees, the protection of the forests from fire, insect and disease; the replanting of forest land; the instruction of forest students, with examples of the losses due to lack of scientific forest management—in short, every condition in the use, the development, the protection and the growing of trees.

A souvenir given to each visitor is a circular containing forest scenes in colors and this was eagerly sought and highly commended at Chicago. Copies of the magazine *AMERICAN FORESTRY* are also given away. It is especially desired that school teachers and children should visit the exhibit. It is to be on the second floor of the Grand Central Palace, near the middle of the hall.

WHAT IS A SHADE TREE WORTH?

HOW many people know what a shade tree is worth? How many ever give a thought to its value? Its grateful shade is enjoyed, its beauty is appreciated, both in a general sense, but few perhaps ever stop to think of its actual cash value. Perhaps this is never brought home more forcibly to a man than when a shade tree in front of his residence, a tree of which he is proud, is damaged or destroyed. Then ask him its cash value. He is likely to measure it by his own sense of what the tree has meant to him. Not unnaturally he may declare the tree worth hundreds of dollars to him. He will tell you what is only too apparent, that it cannot be replaced at once for thousands of dollars. It will take years to grow a similar tree on the same spot.

It was somewhat startling to the people of Ann Arbor, Michigan, to learn from the recent report of their city en-

gineer that the shade trees of the city are valued at \$290,000. This is over a quarter of a million dollars' worth of property which the average man might never consider in giving an estimate of the city's wealth.

Prof. Filibert Roth, of the Forestry Department of the University of Michigan, was asked to give the valuation, and his report names this modest sum. For the purpose of estimating the value of the trees and shrubs owned by the city, it was assumed that trees stand two rods apart throughout the residence sections of the city. According to Professor Roth, a tree is worth \$10 when it is nicely established and is four inches in diameter at a point breast high. Figuring the compound interest at five per cent, this \$10 has grown into \$20 in only 18 years. All trees are figured on this basis, since hundreds of them might be rated at more than \$100 apiece. It is estimated that there are in Ann Arbor

at the present time, about 12,000 shade trees which measure six inches in diameter, besides over 2,000 smaller trees set out in the last fifteen years.

In discussing his report Professor Roth says:

"Why, as a matter of business, it may be said that these trees could not be replaced for this sum of money. A shade tree grows in value up to a certain time, then remains stationary in value for many years, and after that declines. But until it is a good tree and really does the

service expected, it is fair to charge cost and interest to the tree. Generally a tree is over twenty-five years old before it is a serviceable shade tree and 'pays its way.' If it is worth \$10 when it is five years old it is worth \$20 at the end of twenty-five years. From the standpoint of city beautification and considering the enjoyment people get out of them, good shade trees are worth \$100 apiece. This is the valuation placed on trees by the city of Springfield, Massachusetts."

SAVE THIS FOREST LAND

A GREAT deal of enthusiasm was manifested at the recent meeting of the Minnesota State Forestry Association at St. Paul in the plans for a campaign to be conducted all summer for an amendment which will come before the people next November at the general election. The State of Minnesota at the present time owns about three million acres of land and under the provisions of the Constitution this land is to be sold. The forestry amendment provides that all such land which is better suited for tree growth than for farming shall be set aside to be used as State Forests. This would give the State perhaps one million acres of forest land, to be managed according to forestry principles, and this would be the beginning of a real forestry policy for Minnesota.

It is naturally of great interest to all concerned that this amendment pass. It would really be a corner-stone, as it were, in the forestry development of Minnesota. If these one million acres will be retained as State Forests, the State Forest Service can go ahead and show lumber corporations that forestry really is practical, and if the State Service is given the opportunity to show what really can be done with reforestation and forest management, the time

will not be far off when the State will branch out on a large forest policy.

The time has come when Minnesota has to recognize the necessity of the management of its forests. Although there are still approximately seventy-five billion feet of merchantable timber standing in the woods, the people at large appreciate the fact that the proper management of timber lands is of vital concern. The annual value of the timber crop of Minnesota is fifty million dollars. It takes forty thousand horses to move this crop and three hundred thousand men to log, haul and manufacture it. The lumber industry is the second largest in the State, and one-third of the total output of Minnesota's farm produce is consumed by those in the lumber industry. Minnesota is the largest lumber producing State east of the Rockies, and with proper forest management, could increase its timber production four times, which would mean millions of dollars to the State annually.

The forestry amendment will be the entering wedge toward the proper management of the forest soils of Minnesota, and every endeavor will be made to make the people realize its importance.

Loss By Mistletoe

Mistletoe thrives on the western coasts to an extent not approached in the east. In many places this parasitic growth is responsible, directly or indirectly, for a considerable loss of timber.



ELK ARRIVING AT ITASCA STATE PARK.

THIS CARLOAD OF ELK WAS SHIPPED FROM JACKSON HOLE, WYOMING, TO ITASCA PARK IN MINNESOTA AND WILL BE USED TO STOCK THE PARK.

STATE FOREST AS GAME PRESERVE

By ERNEST O. BUHLER

THE arrival at Itasca Park, Minnesota, of a carload of elk from Jackson Hole, Wyoming, marks the beginning of a plan under which, it is hoped, these magnificent animals will be restored to the Minnesota forests in something like their former numbers. Once they roamed over Minnesota's wilds by thousands. But the hunter's rifle reduced them year after year, until there was danger that they would soon be added to the list of extinct animals.

Then the Yellowstone Park came to the rescue. To it the remaining elk gathered from the mountain ranges around, and there—amid just such an environment of forest, lake, meadow, swamp and snow-capped mountains as was most favorable for their multiplication—they have bred in such numbers that the Government has recently deemed the time ripe for their distribu-

tion among such States as would provide for them the necessary protection in a forest refuge.

State Forester W. T. Cox, of Minnesota, saw the value of the opportunity, and Itasca Park offered an ideal spot for a refuge. It was only necessary to surround with an eight-foot wire fence an area about a mile square, timber land, meadow and lake, and the refuge was ready.

The elk were very wild and difficult to catch, but a deep snow, while hindering their rapid flight, made it possible to tire them out by a persistent pursuit on snowshoes, and capture them by the use of the lasso. From Jackson Hole, where Howard Eaton obtained them, they were hauled over the rugged Teton Mountains to Victor, Idaho; thence they were taken by rail to Butte, to Wadena, to Park Rapids and Itasca State Park. While being driven through Teton Pass,



INSIDE THE PARK.

THE ELK TOOK TO THEIR NEW SURROUNDINGS AS IF TO THE MANNER BORN AND ARE NOW THRIVING AND CONTENTED.

one of the bulls became infuriated and, charging a helpless female, pushed her over a precipice into a canyon, hundreds of feet below. This was the only tragedy of the journey.

As the herd at Itasca Park grows larger—and the Government's experience shows that the animals multiply very rapidly—the plan is to distribute them among different State Forests in various parts of Minnesota. "But where are those forests?" the reader

may ask. The answer is, "There are practically none as yet." Whether such forests shall be created, and whether the beautiful creatures of the wild shall inhabit them, depends on the action to be taken on the forestry amendment to the State Constitution, next November, the adoption of which amendment will permit the use of waste and non-agricultural land for the growing of timber and the harboring of game.

EXAMPLE OF FIRE PROTECTION

By JACK GUYTON

THE actual saving of timber from destruction by fire which may be effected by a local organization is well illustrated by the work of the Coos County Fire Patrol Association of Oregon. This was the first county fire-fighting body in the State and since its organization and successful operation timber owners of twelve or fifteen other counties in the State have copied the plan and formed county associations along the same lines.

The Coos County Association was organized in 1910. W. J. Conrad is the secretary, and he devotes his time to arranging and carrying into execution plans for saving the timber. Before this organization existed sometimes as high as 10,000,000 feet of timber would be burned in the county in a season. Individual owners fought fires but in an unsystematic manner. Last year there was no loss of timber by fire, due to the work of the county association. This is on the theory of reducing the fire

hazard to the minimum and immediately fighting any fires that start.

In 1912 the membership included 41 big timber owners. Now the membership numbers 209 timber owners representing 383,392 acres of timber land, making up the richest natural resource in the county. Those owning small tracts of timber have found it to their advantage to join the association as well as the owners of the big tracts. The State law now provides that owners of timber must maintain a patrol during the danger season. If they do not, the State patrols the timber and charges five cents an acre, which is collected like any other tax. When a timber owner joins the association he meets the requirements of the law and the cost is much less than where he attempts a patrol himself, and the work is much more thorough when done by the association. Last season an assessment of one cent an acre was made and most of this money was used in preventive steps.

The association has built and maintains about 90 miles of telephone lines which connect with the farmers' companies and with the regular lines. Secretary Conrad has his headquarters in Marshfield and can keep in constant touch with the wardens located in different parts of the county. Trails have been built to the isolated localities and make it easier to reach danger points when fires start. The telephones have done much to send warnings to headquarters and allow prompt work in sending assistance to wardens when it is needed.

The field work is in charge of a chief warden and during the past season about twenty-five deputy wardens were kept in the field while extra men were in readiness to fight fires should they be needed. Slashing is done by the association and fire traps burned out so that when the danger season comes each year there is not much chance for fires to get a start.

The association has done much to educate the farmers as to fire danger. The farmers in the timber districts are allowed to use the association telephones for their own purposes and in consideration of this favor are asked to report promptly any forest fires they may see.

Secretary Conrad has conducted educational work in the country schools and has otherwise taught the people of the rural districts that it is to their interest to help the timber owners to protect against fire.

The county organization works in conjunction with the State Forestry Board in the protection work. The cost of fire protection through membership in the county association has been at a lower cost than any of the timber owners could have individually done the same work, and, moreover, it has been more effective. Hundreds of thousands of dollars' worth of timber has been saved from destruction by fire during the four years that the organization has existed. The work planned for the coming season will make the danger of loss of timber by fire in Coos County still less.

Large Sale of Alaskan Timber

Arrangements have just been made for the sale of 40 million feet of timber on the Tongass national forest in Alaska. This forest is cut up by bays and inlets, some of which give an opportunity for taking the timber from the mill to the decks of ocean-going steamers. The Tongass forest is now self-supporting, its lumber product being used largely in local industries, much going into boxes for canned salmon.

Chestnut Trees Again Affected

California State inspectors at San Francisco have found a new canker disease on chestnut trees recently imported from Japan. According to Dr. Haven Metcalf, the Government's expert on such diseases, this appears to be of the same type as the chestnut blight which is ravaging the forests of the eastern United States, and it is possible that the new disease would be equally as destructive if it became established in this country.

THE GRAND COULEE

By WINTHROP P. HAYNES

IN the heart of the vast lava plains which occupy a large part of the States of Washington, Idaho and Oregon,, lies the Grand Coulee, an unsurpassed natural feature of grandeur and wild beauty, which is well worthy of a place among the wonder sights of America, but which is practically unknown and unvisited at the present time.

The Grand Coulee is a great dry gorge or canyon cut by the Columbia river when it was diverted from its course ages ago in the glacial period, by an obstruction of ice, and made this channel across the lava plains in central Washington, in a general southwest direction. It extends nearly one hundred miles across a part of the so-called "Big Bend" region of the Columbia River, where the river turns west, then south and east, before making its final swing to the west which it holds to the sea. The Big Bend region is bounded on the north and west by mountainous areas.

The name "Coulee" is frequently applied all through this part of the country to any dry gully or canyon where water may flow during a small part of the year. In the Big Bend district there are many coulees, but the largest and most interesting is the Grand Coulee.

The northern part of the Grand Coulee extends for about thirty miles from the Columbia River to just south of Coulee City. This portion may be called the Upper Coulee, since it lies at a higher level than any of the coulees farther south. This Upper Coulee is a flat-bottomed, vertical-walled canyon, with several small lakes, some alkaline, along the western margin, which is pre-vaillingly low and marshy. The depth of the floor below the level of the plains is from 400 to 500 feet, and the average width is about one and a half miles, but the coulee is very much wider in the vicinity of Steamboat Rock, a flat-topped mesa ten miles south of the Columbia River, which rises about 400 feet

above the floor of the Coulee. The eastern wall dies out about five miles north of Coulee City, and the level floor rises and merges with the slightly undulating plain which extends eastward for many miles. The western wall, although somewhat broken and eroded back about three miles southwest of the town, continues for about twenty miles to the south in the Lower Coulee.

There is a precipitous drop of about 400 feet in the floor of the Coulee four miles southwest of the town, and the top of the east wall in the Lower Coulee is continuous with the floor of the Upper Coulee. The floor of the Lower Coulee is uneven, and most of the depressions are occupied by lakes which are fresh in the northern part and strongly alkaline in the southern part of the Coulee. The walls of the Lower Coulee south of Moses Lake become less distinct, but the course of the former drainage channel is still clearly visible as it swings to the west and finally joins the Columbia River. The length of the Lower Coulee is about seventy miles.

GEOLOGIC HISTORY OF THE REGION

Many ages ago there was great volcanic activity in this region, and extensive flows of basaltic lava were poured forth and covered the rather subdued old land surface of the Big Bend to a varying depth. In the northern part the cover is relatively thin, and the granite of the old land surface is often exposed, but to the south it becomes increasingly thicker.

Following the volcanic activity the region was irregularly uplifted, causing dislocations of the lava flows and a warping of the surface. After a long period of erosion in which the region was nearly reduced to a plain, the land was again uplifted and the main streams had cut deep channels before the Glacial Period commenced. In the Glacial Period an ice sheet advanced down the



SITE OF AN ANCIENT WATERFALL.

HERE HUNDREDS OF YEARS AGO A GREAT CATARACT POURED OVER THE CLIFF WHICH IS OVER FOUR HUNDRED FEET HIGH. THIS CLIFF NOW SEPARATES THE UPPER FROM THE LOWER COULEE. IT IS ONE OF THE FIRST SIGHTS WHICH THE VISITOR IS DIRECTED TO SEE.

valley of the Okanogan River and extended across the gorge of the Columbia River. This ice dam caused the waters of the Columbia to flood the tributary valleys, and they rose until a low place in the divide was reached, south of the present site of Coulee City. Here they overflowed into the headwaters of a southwestward flowing tributary, and thus reached the channel of the Columbia River again. The divide was cut back and a great waterfall was developed, which must have been the equal of our grandest waterfalls now in existence. As the ice barrier melted away the waters of the Columbia were allowed to resume their former course, leaving the Grand Coulee, with its numerous lakes and springs as evidence of the temporary, pre-historic, cross-country water channel.

This enormous dry canyon with its numerous beautiful lakes, and its site of a great prehistoric waterfall, which was as high as the Victoria Falls of the Zambesi River in Africa, and of much greater extent, may be easily visited by any tourists traveling over the Northern Pacific Railway, by leaving the main line at Spokane, and traveling over the branch line for 125 miles to Coulee City, which is a small town with good accommodations for guests, situated on the level floor of the Upper Coulee at a most advantageous spot to take in most of the interesting and grand views. The trip westward from Spokane is interesting and gives one a chance to see how this section of the country is being developed.

Soon after leaving Spokane we passed through cuts in gravel terraces and crossed a deep, flat-floored valley in which a very small stream is now flowing. This is evidently a channel cut by a large river in the Glacial Period, but now abandoned. The flat floor of the valley is now covered with small farms. After passing through pine-covered, hilly country, and traversing a gorge in the basaltic lava we reached the prosperous town of Cheney, situated in a farming district in low rolling country. Continuing westward we saw many fields of oats on the flats, while pine-covered hills interrupt the general level of the coun-

try. We passed through a belt of pines between Medical Lake and Deep Creek, and then abruptly left them for a rolling, treeless country covered with wheat fields that stretch to the horizon on either side of the track. Most of the farms depend on windmills to pump their water, which is generally obtained from a slight depth by driven wells. We passed through Davenport and Rocklyn and were still in a rich wheat section. The country here began to flatten out, and we saw the lava outcropping, and forming small mesas, and entered a level region of sage brush and bunch grass, with a few nearly dry lakes, with little grazing for cattle and horses and no agricultural development. After a few miles of this we got into more hilly country with scattered pines, and an occasional granite knob projecting through the basalt. Then we entered rolling open country, another great wheat-raising section. Shortly beyond the town of Creston we got a view of the mountains north of the Columbia River. Near Wilbur we entered level country again and saw a small coulee, which runs parallel with the track for some distance. Near Govan a small stream flows in the coulee, and a fringe of trees grow along its banks, the first trees seen for some time. We passed through some more good wheat land about Almira and Hartline, and saw a combination harvester at work, drawn by about thirty horses. From Hartline we swung to the south and descended in a gentle grade about 350 feet to the town of Coulee City, situated at about 1,600 feet above sea level. As we approached the town we got a fine view of the great western wall, which stretches far to the north and south, and also saw how the east wall, about five miles north of the town, bends down and merges with the plain. From Coulee City as a headquarters we traveled by automobile, carriage, horseback or foot to the various points of interest about the Grand Coulee.

The first place we wanted to see was the site of the ancient cataract and waterfall, with its 400-440 foot wall which separates the Upper from the Lower Coulee. By driving or riding about



WHERE THE WATER'S ACTION IS APPARENT

THIS VIEW SHOWS HOW MANY YEARS AGO THE LAKE WAS CONNECTED WITH ONE TWO MILES AWAY BY A STRETCH OF WATER BETWEEN THE TWO LINES OF CLIFFS. THIS ANCIENT WATER COURSE IS NOW DRY.

four miles to the southwest of the town, over the nearly level floor of the Coulee, which is dotted with sage brush and basalt hummocks, past several farms with small orchards, the brink was reached and its western margin followed until a wonderful panorama was disclosed. Stretching to the eastward for about three miles was the serrate headwall of the Lower Coulee, with a large and small plunge pool lake lying at its foot, occupying hollows in the rock carved out by the falling waters which gradually wore the cliff back several miles up the Lower Coulee to this point during the time in the Glacial Period that the waters of the Columbia River with water from the melting ice were flowing in this high level channel. Different parts of the cliff have receded at different rates, and the plunge lakes lie in the deepest embayments, separated by a flat-topped remnant of the cliffs, which is partly fallen to pieces. The larger of these lakes is called Castle Lake, and is a beautiful sight as viewed from the top of the cliff. The basalt rock of the cliffs turns a rusty brown under the effects of the weather, and is frequently covered with orange or greenish-yellow lichens in great patches, so that the cliffs are generally bright colored.

We continued along the road for about two miles more to the southwest and obtained a fine view down the Lower Coulee for several miles, and saw nearly the whole floor occupied by a chain of lakes, which are nearly continuous. The nearest lake was Blue Lake, and the next, partly hidden by a bend in the Coulee, is Alkali Lake. The west wall here has a height of nearly 900 feet, but the long talus slope which extends about half way up, makes the height seem less. The east wall is about half the height of the west wall. The fringe of vegetation about the shore of Blue Lake, and the farm with a fine orchard at the northern end of the lake added a touch of green, which made the scene one of great beauty and grandeur.

The road descends to the floor of the Lower Coulee from this lookout point, and if in a light wagon, or on horseback, or foot, it is possible to make the descent. The road is so very steep and has such sharp turns that it is not advisable to descend in an automobile. On reaching the bottom we went through the farm and fruit orchard to the shores of Blue Lake, and out on the lake in a boat and landed on some of the small islands. Later we went up to Castle Lake and the other small lakes near the foot of the fall, and traveled up a road to the east which leads past another small farm and into an eastern branch of the Lower Coulee.

This eastern branch of the Lower Coulee is in many respects the most interesting and beautiful, because it is comparatively narrow, and a large part of it is occupied by a long, narrow lake, which is bordered by vertical cliffs. The lake is called Deep Lake, and from the vertical walls and the absence of any beaches it must be very deep, although no measurements of its depth have been made so far as could be ascertained. It is possible to get out of this east branch at one place only, and that is on the south side, where a road has been made which rises through a notch in the wall and reaches the upper level, and then swings to the north past the head of the east branch around to Coulee City.

The Deep Lake branch of the Lower Coulee may be reached most easily by a walk or drive of about two miles to the south of Coulee City. This branch falls away gradually in a series of steps, with drops of from 15-50 feet, which must have caused beautiful cataracts when the water was flowing through here. A few small pools remain in the deeper hollows of the upper part of this channel. We swung to the east past the head of this branch, and then following along the southern brim soon came to a lookoff point from which we looked down upon Deep Lake, the surface of whose waters is about 425 feet below. The walls rise from the water in a vertical cliff for about 100 feet, and then



DEEP LAKE.

THE SURFACE OF THE WATER IS 425 FEET BELOW THE ROCK ON WHICH THE MAN IS STANDING. THE LAKE IS SO DEEP THAT SOUNDINGS COULD NOT BE TAKEN.



ANOTHER VIEW OF DEEP LAKE.

IN THE DISTANCE LOOMS THE GREAT WEST WALL BARRIER. THE COLORS OF THIS LAKE RANGE FROM A PECULIAR EMERALD GREEN TO A DEEP BLuish GREEN.

recede in a series of great platforms, formed by the successive lava flows, to the upper level which forms the floor of the Upper Coulee, upon which the town is situated. The walls of this east branch of the Lower Coulee show columnar jointing particularly well.

Looking westward down the east branch we saw Deep Lake far below, like a winding river in a deep canyon. In the distance looms the great west wall barrier. The colors of Deep Lake vary greatly with the time of day, ranging from a peculiar emerald-green to a deep bluish-green, but the lake is always wonderful, and flanked by the varicolored basalt rock it forms a scene that should be preserved in color by some artist.

We decided to take a day trip north, in the Upper Coulee, to Steamboat Rock, a distance of about 20 miles. On starting north from the town we saw perched on the top of the west wall a short distance back from the edge a great basalt block as large as a house, which was evidently transported a short distance and left by the ice sheet which spread over the western part of the Big Bend region. This was Pilot Rock, a landmark easily seen for many miles to the east. Five miles to the north the inclined lava beds of the east wall rise out of the plain and flatten out, forming the eastern wall, which has an average height of about 450 feet. We noted that the edges of the inclined lava beds are truncated by the present surface of the plain. This shows that after the warping and irregular uplift, the region was greatly eroded and worn down nearly to a plain before the final uplift to the present elevation. Going north on the flat floor of the Upper Coulee we passed a few long, narrow lakes lying in swampy depressions near the foot of the west wall. The lakes have a dense growth of rushes about their shores, and usually a fringe of white alkaline deposits, where the water has evaporated and left the salts held in solution. About ten miles to the north of the town the Upper Coulee makes a bend and we got our first view of Steamboat Rock, which looks like the hull of a great battleship floating toward us. The

Coulee narrows to a width of about a mile a short distance below the rock, and then widens out until in the vicinity of the rock it is between three and four miles across. Steamboat Rock is a mesa or table mountain of horizontal lava beds about 450 feet high and one and a half miles long by one mile wide. On the floor of the Coulee about a half mile north of the rock is a fine ranch, with an orchard and garden, where a stop for lunch was made. While resting in the shade of the numerous trees about this ranch we enjoyed a splendid view of the great mass of Steamboat Rock. Time permitting, we extended our trip ten miles, to the northern end of the Grand Coulee, where we looked down on the mighty Columbia River flowing in its deep gorge, which is now cut several hundred feet below the level of the floor of the Coulee. The Coulee north of Steamboat Rock narrows again and the floor becomes very uneven as the lava cover becomes thinner, and the old granite surface with its hollows and knobs is exposed. By ascending to the top of the east wall of the Coulee we had a very grand and comprehensive view of the northern part of the Coulee, and looked down over 1,000 feet to the waters of the Columbia River. To the northwest we saw through the blue haze the mouth of the Okanogan valley, bordered by low mountains on the west. To the north of the river rises a granite range of low mountains, and eastward the slightly rolling lava plains stretch to the horizon.

The drainage of the Grand Coulee is for the most part underground. The chain of lakes occupying the western border of the Upper Coulee are of varying degrees of salinity. In most cases there is no visible connection between the lakes, and they have no visible drainage outlet. The lakes of the Lower Coulee are fresh at the north and strongly saline at the south. Some of the northern lakes overflow in the rainy season and drain south into the more saline. Soap Lake is the most saline of the chain, and the waters have been analyzed and found to be rich in sodium salts, chiefly the carbonate and sulphate. Moses Lake, farther south, is compara-



CASTLE LAKE.

LYING IN ONE OF THE DEEPEST EMBAYMENTS OF THE GRAND COULEE, THIS LAKE FORMS ONE OF THE MOST BEAUTIFUL VIEWS. THE BASALT ROCK OF THE CLIFFS IS A RUSTY BROWN, OFTEN COVERED WITH PATCHES OF ORANGE OR GREENISH-YELLOW LICHENS.

tively fresh, and drains southward into Crab Creek which, after flowing for a while at the surface, sinks into the soil and disappears.

In the Grand Coulee near Coulee City are several fruit farms of young trees which are doing nicely. Water for irrigation is obtained either from springs, which are often tapped within a few feet of the surface, or pumped from some of the fresh lakes which are suitably situated. In the oldest orchard the trees are about six years old and are just beginning to bear. This orchard is situated about a mile and a half north of the town and is well worth a visit. Here apple and peach trees alternate in the rows, but the peach trees will eventually be cut down, when the apple trees become large enough. In between the trees the owner raises great quantities of fine watermelons which are shared and greatly appreciated by the inhabitants of the Coulee. He is also

raising corn-fed hogs for market in Spokane and for shipment farther east. All of the farms about the Coulee have small vegetable gardens where sufficient for home consumption is produced. The interest of most of the people living near Coulee City is in wheat, and the future of this section seems to rest upon the successful cultivation of that staple product, which can be grown over most of the plains to the east of the Grand Coulee. The higher parts have a good soil cover of decomposed lava and more or less rain throughout the year, so that this region is now producing a considerable quantity of wheat raised by dry farming methods. A crop of 20-25 bushels per acre is about the average yield, but 40 bushels per acre is occasionally reached. The production of fruit and other special crops upon the small areas that are favorably situated for irrigation will undoubtedly increase, but will always be of minor importance.

SPRING SEEDING OPERATION

ACTIVE preparations for further reseeding of the Roubaix burn in South Dakota are being made by Forest Supervisor Kelleter. Approximately 1,000 acres will be reseeded this spring and to properly handle this work a Forest Service camp will be established on the ground. During past seasons the work was handled from Roubaix and the laborers employed were for the most part such as lived at Roubaix, but this season's work will be a considerable distance east of Roubaix and the establishment of a camp therefore becomes necessary.

A total of 6,000 acres have already been reseeded at Roubaix and a good stand of trees are to be found over the entire area. This work was inaugurated in 1905 and has been continued each year since. Except for the dry seasons of 1910 and 1911, the work has each year been successful. Native yellow pine seed is used. Experiments

have shown that the best results are obtained by using this species. An extensive experiment was made with Austrian pine, but the results did not seem to justify further use.

What is known as the "seed spot" method is used in all this work. This consists in the removal, by use of a mattock, of the top grass, or sod, for the space of about 12 inches square to expose the mineral soil, and the dropping of a few seeds into the spot and then gently covering the seed with some of the loose soil. By clearing away the sod the young seedling, on sprouting, has a fair chance of pulling through as there is no competition for light and moisture with the grass, as would be the case were the same not removed. Under normal conditions a seed will germinate or sprout and show signs of life in about three weeks after being placed in the soil.

FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER

V. THE PRIVATE NURSERY FOR RAISING STANDARD TREE SEEDLINGS AND HOW TO PREPARE AND MANAGE IT.

WHILE State transplants may be had at \$4 a thousand or thereabouts, and nearly every species of tree used in forestry can be bought in either seedling or transplant from any of the big forestry companies which make a specialty of planting wholesale, it is nevertheless a fact that many tree lovers would like to own and run a small nursery in which they not only can raise all the standard seedlings they need for forest improvement but also can experiment with species that have not so far received any attention except in ornamental tree nurseries, and which therefore would prove an exceedingly expensive purchase on a large scale. My good friend and tutor, Prof. Hickel, of Versailles, has for his special hobby an experimental nursery which occupies the whole of what would be otherwise a French gentleman's garden, and, if you wish to win your way right to his heart, send him some fertile seeds of any species of tree in any part of the world outside of the tropic zone, and they will be received with puffs of thanksgiving, duly analyzed, weighed, measured and sketched; after which all that are left will be planted and the forthcoming seedlings looked for with the intense interest of the true scientist and raised with all the loving care of the tree enthusiast. His book "Seeds and Seedlings" is the standard French work on the subject.

The writer has been fortunate in having seen in practical operation the largest and most advanced nurseries in France, Germany and our own country. I have watched the force under friend Pettis, State Forester of New York, planting beds of seedlings, digging up those that were ready for transplanting,

setting them out in the transplant beds with Prof. Toumey's wonderful semi-automatic transplanting jig which sets out thousands of them in an hour; have watched the handling of the lattice-and-wire cages which Pettis devised to protect the seedlings beds against sun and birds, and compared it with the primitive moss and brush nursery protection of Europe, with their mat screens and rustic frames; have seen plantings of all ages, spacings and forms, from the common hole method to the mound system of Baron Manteuffel; and I have planted and raised some thirty-seven varieties of forest trees myself.

For the owner of a country estate who wants to do his own planting I would say, go ahead slowly at first and accumulate some experience in a small way, more with the idea of making an interesting experiment than anything else. If you need quantities of small transplants at once, you had far better buy them from a State nursery or a forestry company than wait four years to learn whether you have succeeded or failed with your nursery operations. But, while there are a lot of little practical kinks which have to be learned to make a success of your plantings, there is no reason why one should not start right in on a small scale and learn the art, for there is nothing in it that any sensible man can not easily manage.

To begin with location, there are two sites available, of which you can take your choice, depending upon labor and local conditions. The first is the *pepiniere volante* or temporary forest nursery located out in the forest itself, a clearing in the forest soil with a northeasterly exposure, and the second is in the home vegetable garden, with artificial means for shading, etc. The



A FRENCH PEPINIERE VOLANTE OR TEMPORARY FOREST NURSERY.

first is less expensive and does not require as much personal care, but the growth is slower and damage from surrounding forest conditions quite extensive; the second produces large quantities of seedlings and transplants in a small space, but requires a lot of looking after, and some expenditure for apparatus.

The principal expense of the forest nursery is that of digging a two-foot trench with perpendicular walls clear around it, to keep out rodents, cut-worms and underground fungi; the principal expense of the home nursery is building the wire and lath cages which are put over the beds to keep out birds and produce artificial shade. Here is Baron Manteuffel's own description of the formation of his forest nurseries at Colditz, Saxony, which produced and planted some $2\frac{1}{2}$ million trees: "It is a good idea to divide the pepiniere (nursery) into numerous small parcels scattered throughout the forest. In the general run of the soil we select the best obtainable, that is to say fresh, loamy,

permeable, presenting a thick couch of dead mould over a reasonably fertile mineral soil. It is not easy to fulfil these conditions, but we earnestly beg our brother foresters to give this selection all the care possible; otherwise they will never succeed in producing strong, healthy plants with the desired spread of roots. We have already said that we have no admiration for plants raised, so to speak, under hothouse conditions. In Saxony most of our plantations are in a mountainous country under a sky inclement and stormy, and for this reason we locate our pepinieres in similar weather conditions. The forester should select his location only reasonably protected from weather damage, even though he may have to wait three years for the plants to acquire dimensions reached in two years in milder climates.

"As regards the preparation of the soil in the pepiniere: The growth of weeds ceases habitually in the month of October, and it is then that we chose by preference to clear the spaces destined for our pepinieres. We scythe



A BIG GERMAN TRANSPLANT NURSERY.

down over the space the weeds and brush and give it a light cultivation about the depth of a spade. Having carefully picked out stones and roots and knocked the rich earth from roots of weeds and grass, we then level off the spot as much as possible and collect in piles all the brush, weeds and roots, and burn them, here and there, over the plot. The ashes of these are scattered broadcast and raked into the soil. Finally we surround the plot with a trench two feet deep to keep out small rodents, mice, etc. At the return of spring, when the last frosts are no longer to be feared, we give the plot a light culture with the rake and then proceed with the layout of the beds and walks.

"We lay out the plant beds in long, narrow five-foot ribbons, running east and west across the pepiniere. The seedlings grooves are next creased in the soft earth by means of Bavarian planks, which are laid across the bed alternately, and one has only to walk on them to obtain two double grooves 7

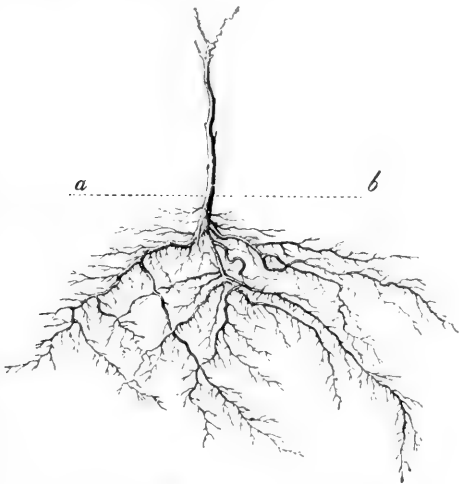
centimeters ($2\frac{1}{2}$ in.) wide spaced 19 centimeters (about 8 in.). For large pepinieres we use a harrow of which the teeth are the proper width to cut suitable seeding grooves and run it lengthwise of the beds.

"As to quantity of seeds required, we find that for spruce half a pound of good seed suffices for 19 square meters of pepiniere. For sylvester pine we use practically the same amount of seed as we find that to avoid the *roussi*, a fungus disease that attacks the young pines in their second year, it is necessary to mix the spruce and sylvester pines in the proportion seven-eighths spruce to one-eighth pine. We do not advise the culture of fir in temporary pepinieres at all, as to give the young plants the thick mat of roots they should have it is necessary to clip the pivot root and transplant, and this should only be done in large permanent pepinieres."

This, in brief, gives an outline of a tried method of raising seedlings that will make good forest growth without the usual transplanting. The seeds are

sown in rows instead of broadcast as in the garden nursery beds, and are so spaced as to allow the seedlings room enough to become vigorous plants on their original planting site. Moss is kept over the seed rows until the sprouts appear and then placed between the rows to keep down weeds. Owing to the northeast exposure, the growing conditions imitate Nature very closely, having only the morning sun direct, and the rest of the sunlight is filtered through the trees along the south wall of the nursery after noon. In this way the young plants make a hardy, if slow, growth, without the necessity for han-

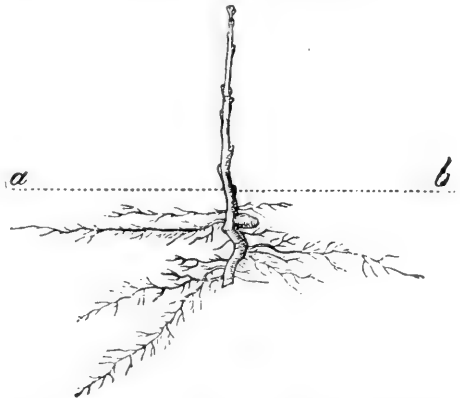
is of such importance that the writer would be in favor of root pruning in the soil sooner than omit it entirely. Left to themselves all forest tree seedlings follow their natural instincts and send down a deep tap root, not for food but for protection against being pulled up by the roots by the first rabbit that nibbles their tops. A young fir will send down a root twelve times as long as its trunk above ground, and all the other species from four to six times as long. These roots get a firm hold on the mineral soil but contribute little to the nutriment of the young tree, for all the feeder roots must seek their food in



YOUNG OAK TRANSPLANT IN ITS FIRST YEAR. NOTE ROOT SPREAD DUE TO CUTTING TAP ROOT.

dling shade crates daily, and, as they grow in the same soil they are transplanted to in the main forest, they have no unaccustomed soil conditions to readjust themselves to later. It is a well-known fact that domestic vegetables and trees will not succeed at all in forest soil, because it is too sour and too lacking in the bacterial growth that these plants require to thrive, and the reverse is undoubtedly true as far as my own observation goes. Nursery forest trees raised in rich vegetable soil have been so modified in their root habits that they have a lot of adjusting to do and lose several years doing it before they take hold of raw forest soil.

The matter of cutting the pivot root

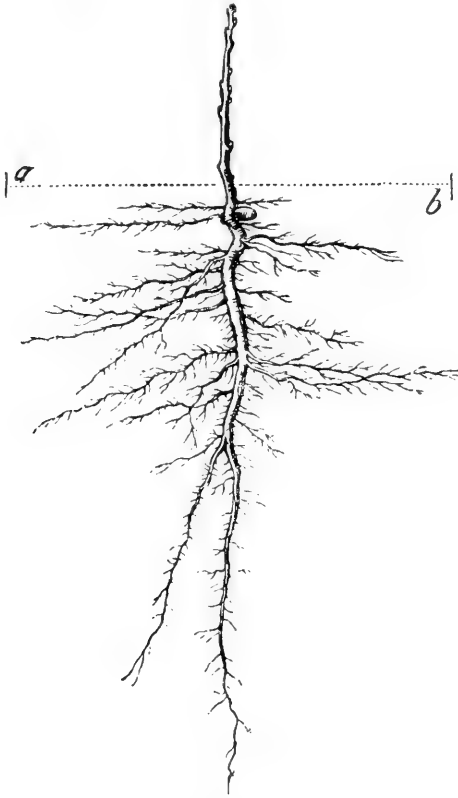


YOUNG OAK SEEDLING WITH TAP ROOT CUT, READY FOR TRANSPLANTING.

vaporous form in the humus under the mat of dead leaves, where the warmth of the sun and air above can produce vapors suitable to enter the little root buds. Now we know well that our seedlings will never need their tap roots for protection, so, upon transplanting, we snip this root, thus forcing the plant to put out its feeder roots forthwith. The result upon the growth of the plant is inconceivable to one who has not actually seen it done. Our illustrations show the contrast between young oak, ash, fir, pine and spruce seedlings with and without their tap roots cut. Note the far greater growth and vigor of those with the tap root removed. In commercial nurseries this is done without digging up the tree by what is known as root pruning, *i. e.*, the spade is driven into the ground all about the

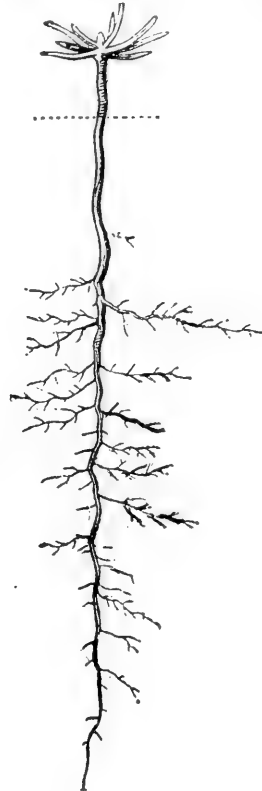
plant, cutting its long, rambling roots and forcing it to put out a set of thick feeders close around the stem. When transplanted it then has a large proportion of its roots already grown and in the ball of earth, and, when once in its final site, these form the nucleus of feeders which stretch far and wide through the humus.

State Forest Service, has gone about as far as any man in the public service towards the development of the systematic raising of millions of young trees, and Prof. J. W. Toumey has made the greatest advances in developing the commercial raising of young trees for forestry purposes. The methods of both are similar; the unit bed is 4'x12', rais-



YOUNG OAK SEEDLING JUST OUT OF SEED BED

American practice has tended towards raising large quantities of seedlings in as compact beds and as rich soil as possible, transplanting them to beds on larger spacing, and then setting them out in the field as four-year transplants, that is, plants which have had two years' growth as seedlings and two years as transplants. Such specimens are husky little trees, standing about a foot high above the root collet, and taking a hole a foot in diameter by nine inches deep to accommodate the root spread. C. R. Pettis, of the New York



YOUNG FIR SEEDLING TAP ROOT TWELVE TIMES AS LONG AS STALK ABOVE GROUND

ing about 7,500 seedlings, a rich, well-fertilized soil is selected and cultivated, the seeds are sown broadcast and very thickly, tamped in with a flat rammer, and over them is sprinkled a quarter inch of sand. The wooden crate, which is used so much throughout the younger days of the seedling, now comes into use and is put over the freshly seeded bed and closed in with loose laths between the shade laths with paper tacked around the sides. After a period of some three weeks' germination the paper and loose laths are removed, as



REFORESTING A DENUED HILLSIDE, MERDARE, FRENCH ALPS.

all the seedlings have sprouted and require air and sunlight. On mild days the lath crate is also removed, leaving nothing but the wire cage over the bed, which keeps out birds and prevents them from picking off the tender young shoots of conifers, of which they are very fond. If the sun gets hot enough to wilt the young plants the lath crate goes on again, producing the artificial shade that is gotten by a north exposure in the forest nursery. The principal enemy to be feared is, however, "damping off," a fungus disease which attacks the young conifers when conditions of cold and dampness are maintained in the seed bed for any length of time. During the second year the seed bed requires not much attention beyond weeding, although, during the first year, the lath cage has to be on most of the time. At the third spring the seedlings are dug up, put in a transplanting jig, a sort of spring clip four feet long with grooves spaced four to six inches for the seedling stems. The pivot roots are clipped with a single sweep of the knife and the young seedlings set out in the transplant beds to

remain there two years more. The cost is about \$3.90 a thousand to produce four-year transplants of pine or spruce by this method, and it is a practical way of handling large quantities—millions—of forest trees, with very few losses and not much area per tree of nursery space. It is particularly adapted to conifers, but by no means so handy for the broad-leaved species because of the much greater room that the latter require.

We have now an outline of the two principal nursery methods in use today in Europe and at home; how do they apply to the owner of the country estate? In the first place, he will not be particularly interested in raising great quantities of any one species but will rather want a nursery that will have versatility enough to prepare quite a number of different species of tree seedlings in batches of a thousand or so, with the idea of avoiding the expense of paying the commercial nursery prices for young trees, which run into a great deal of money that might just as well be saved. Our nursery should have a few crates of the 4'x6' size, that can be handled by one man, for raising conifer-



A SEED BED NURSERY AT LAKE CLEAR JUNCTION, NEW YORK, CONTAINING THREE MILLION SEEDLINGS IN TWO ACRES

fers to reforest abandoned and stony pastures; and the beds for this crate work, with its intensive planting, should be enriched with well rotted leaf mold compost, but not with commercial fertilizers, as many of these are extremely unsuited to wild forest seedlings. The balance of the nursery space should be devoted to the broadleaved species, oaks, maples, ashes, tulips, hickories and any other specialties that you intend to raise. This soil should be cleared forest loam with northeast exposure, a cleared forest meadow in the woodlot, and the seeding done much as in European practice with the seeds in rows, spaced some three inches in the row and transplanted and clipped in their second spring. They are ready to set out in the forest in the third year, that is the fourth spring, and should be set on about nine-inch spacing with this end in view. The ground in between is covered with a couch of dead leaves with the object of keeping in the moisture of the soil, keeping down the germination of weeds and adding to the nutriment of the young plants by the gradual decomposition of the dead leaves—in effect Nature's own way of caring for her little ones in the forest. A reasonable amount of dead twigs and limbs should be scattered over this

couch of dead leaves in between the rows, for the amount of leaves that the wind can steal in a single season is almost incredible to one who has believed that his work ended with carting the leaves and spreading them over the bed.

As to the depth to plant seeds and the time, an inch deep is plenty for acorns and nuts, much deeper for black walnut, half an inch for maple and ash. Almost all of the them are planted as early as possible in the fall and usually sprout and get to about four inches high before going into that winter. Red maple seeds in the spring, in May, and its young ones have all summer to grow in. The conifers all sprout in the spring, and are best seeded in April and May after the frosts are well out. If put in earlier they are quite apt to rot, for Nature's way of planting them consists in giving the seed blown from the cone in the fall a whole winter to work its way down to the quickening combination of humus and mineral soil, and if put in this soil without the heat to start germ growth the seed quickly rots. Ash seeds should be gathered in the fall as soon as ripe and piled with sand and leaf compost in beds not over ten inches deep. They are to be turned over several times during the winter



STATE FORESTERS VISITING THE NEW YORK STATE NURSERY AT LAKE CLEAR. STATE FORESTER PETTIS OF NEW YORK ON THE EXTREME LEFT.

and sown in the nursery beds broadcast on about inch spacing where they will do for the first season. The winter rotting clears them of the samara wings and prepares the seed for germination. They are ready for transplanting in the second spring, and for the forest in the third spring. Sugar and silver maple samaras ripen in October and fall to the ground. The seeds can be kept through the winter in moderately damp sand, or else sown at once in their beds, in which case a larger percentage of them will fail to germinate. In either case, they will come up the first spring, are transplanted the second spring and are ready for the forest in the third. For liriiodendron, the seeds should be sown the autumn they ripen, being picked from the sheath and sown in beds of fine, rich sandy loam in a moist, shady location. They will come up the following spring, or, if sown in the spring, will come up the following year. With the acorns of the dozen species of oaks which you will have to deal with in your forest, an

immediate fall planting is the best course. They are apt to either germinate or dry out if kept through the winter in sand, and once germinated your troubles come on apace. In my own neighborhood the white oaks succeed in starting a number of seedlings in the same fall the acorns come down, while the red, blackjack, and chestnut oaks usually hold over until spring and we get a fine germination where there is the least sun on the forest floor. The first acorns down are always wormy, so be chary about gathering them, but the second big storm will fill the forest with large, heavy, meaty acorns which will sprout in a few weeks if planted at once, and by mid-October the seedling is three inches high and has two to four small leaves on it. In colder localities the acorns will not sprout at all until the following spring.

In one part of your nursery there should be space reserved for saplings. While four-year conifers are about right for forest underplanting, a good many of the broadleaved species will

reach a tree six feet high in five years and are in better shape to set out than if put in the forest on their third spring. If at that time, instead of taking to the forest you make a second transplanting to the sapling bed, you will add to the vigor of the succeeding root growth and push the young tree along faster than if you had set it out. Specimens for particular localities where they are wanted for their scenic value as soon as possible had best be forced here in the sapling bed, being set out on eighteen-inch centers with the usual dead leaf couch in between rows. At their fifth spring they are ready for use and far ahead of the three-year tree already out in the forest two years. As a lot of the root system will necessarily be lost in digging them up, they should be pruned somewhat in the crown so that the tree can occupy itself exclusively with root growth during its first year in the forest. And this must not be done severely as with fruit trees; neither oak, ash, maple or beech can be pruned to a whip, as is done with a young peach, and to cut it off short as is done with a one-year apple would be simply killing the tree with excess of sap, for the bark of an oak is so tough that it by no means can push forth new branch buds with the ease of the fruit trees, while a beech must have shade on its trunk when young or the bark will be scalded. The only pruning required while in the sapling nursery will be a clipping of the outer twigs to a pyramidal head and the removal of the second branch in case the tree seems inclined to fork. In all planting of broadleaved species provide for a good many more than you propose to set out, so that you will have a chance to reject all crooked seedlings and return all the spindly ones to the nursery. Having decided upon an area that will raise all the conifers, broadleaves and saplings you require on the above spacings, see that it has access to running water for irrigation or sprinkling in time of drought, make its boundaries rectangular for economy in bed space, trench around it to keep out rodents and put a two-foot chicken wire fence along the inside edge of the trench to keep out rabbits which would otherwise

kill off all your young broadleaves by nibbling the tender young buds. You will then have a practical working nursery that well repays its cost in saving seedling and sapling expense.

The subject of underplanting the forest, of planting abandoned pastures in conifers and of planting both conifers and broadleaves at advantageous points in the forest has been pretty well gone into in previous articles in this series. I show an example herewith of reclamation work in Merdard, French Alps, which applies to reforestation work on our own hillsides where the slope is very steep. In the case shown the slopes had been entirely denuded and not even heather could get a foothold; the brook in the ravine had gone dry, and scouring of the mineral sub-base had begun. The first thing to do was to arrest this scouring, and this was done by digging shallow trenches, parallel, six feet apart, with the mound of earth excavated always piled in a low rampart on the downhill face of the ledge. This formed a pocket, in which the rows of young transplants were planted forthwith. The scouring action of the rains immediately began to fill in the hollows behind the ramparts and reduce the slope to a sharp angle again, but long before this could be accomplished the young trees had taken firm root in the soil of the ramparts and ledges and had made considerable growth. They at once stopped the scouring and soon formed a forest mold of their leaf-fall, and in a few years that hillside was covered with a dense forest and the springs began to flow once more. France spent over 260 million dollars in reclaiming such denuded slopes in the French Alps and the Pyrenees, and brought over 10,000 torrential streams under control in this way. The forests were cut down and sold by the extravagant and ignorant Directory of 1790; for fifty years the country endured the droughts and floods occasioned by this denudation of the mountain slopes, and finally decided to restore the forests at any cost. The resulting increase in land values alone has more than paid the Republic for its expenditures.

MANY USES OF THE FORESTS

ALMOST every conceivable use to which land may be put is represented in the permits reported by the Forest Service for special projects on the national forests. Some of the uses shown range, alphabetically, from apiary through brickyard, cannery, cemetery, church, cranberry marsh, fox ranch, marine railway, rifle range, and turpentine still, to wharf and whaling station.

There are 15,000 permits in force for such special uses, which are distributed geographically from Alaska to the Mexican line, and east to Florida. This figure does not include any of the 27,000 permits in force for grazing cattle and sheep on the forests; nor the 6,000 transactions for the sale of timber, and the more than 38,000 permits issued last year for the free use of timber by settlers, miners, and others in developing their homesteads and claims; nor the nearly 300 permits for water-power development.

California led all the national forest states in the number of these special use permits, followed by Arizona, Colorado, Montana, and New Mexico in the order named. The largest single class of permits was for special pastures, or corrals, to be used for lambing grounds, shearing pens, and the like. Next came

rights of way for conduits, ditches, and flumes, practically all of these being free. Various agricultural permits come third, telephone lines fourth, with more than a thousand permits for 6,500 miles of line, and drift fences for the control of grazing animals, fifth. In both of these latter classes, too, practically all of the permits are free. Reservoirs for which more than 600 free permits were issued for the occupation of more than 100,000 acres, come sixth. The rest of the uses are not classified, though there are a large number of apiaries, camps, summer hotels, and schools. The use of the government's lands for schools is given free; for hotels a charge is made.

The principle which governs the charge is based, according to the Forest Service, on whether or not the use of land is sought by the permittee for a commercial purpose. If it is the intent of the user to make money from a resource which belongs to the whole people, the Service holds that he should give a reasonable return for that use. If, on the other hand, farmers want to use government land for their own telephone lines, irrigation works, and schools, the government gives them that use without cost.

Railroads and Forest Fires

New Jersey is said to have the greatest proportion of railroad mileage of any State in the country, or one mile of railroad to every three square miles of territory. This makes an unusual risk of forest fires set by railroads.

Building Forest Trails

The heavy storms in southern California during the past rainy season wiped out many miles of trails in the national forests of that part of the State. They are now being rebuilt for the coming summer, for use in fire protection. They are also of great use to tourists, campers, and prospectors.

Perhaps a Bad Fire Season

In many parts of the West snow is leaving the mountains earlier than usual. Foresters say that this may mean a bad fire season, and they are making plans for a hard campaign.



TULIP TREE - LEAVES UNFOLDING FROM THE BUD

YELLOW POPLAR PROFITABLE

YELLOW poplar, one of the finest and the largest of American broadleaf trees, can be grown profitably in the timber tracts of the southern Appalachians. This conclusion is set forth in a report written by W. W. Ashe, of the Forest Service, and recently published by the Geological Survey of Tennessee.

An investment in young yellow poplar stands will yield 4 per cent compound interest. In addition to this, there is a probable, though indeterminate, return due to the natural increase in stumpage prices. This increase, based on average-sized yellow poplar trees, has amounted during the past 20 years to 13 per cent compounded annually.

There is more lumber produced from yellow poplar than from any other southern hardwood except oak. The commercial range of the tree is restricted mainly to the southern Appalachian Mountains of the Virginias, Carolinas, Kentucky, and Tennessee,

where it grows to be more than 100 feet high and over 5 feet in diameter. Some specimens have been found in Virginia nearly 200 feet high and 10 feet through.

The wood itself has the same general characteristics as that of white pine, and its range of uses is about the same. Each is utilized for almost anything not requiring great strength or toughness.

The qualities which favor the extensive use of poplar are its straight grain, its lack of odor, the readiness with which it takes paint, and the ease with which it can be worked. Doors, paneling, packing boxes, type cases, drawers, kitchen woodenware, and toys are made largely of yellow poplar. In Tennessee wooden mixing bowls are turned out in sizes up to 4 feet in diameter from one piece of wood. Yellow poplar stands well in situations exposed to the weather, as in pumps, outside steps, shingles, and fencing. It is not durable in contact with the soil, though it can be readily treated with preservatives.

From the earliest times poplar has been used in making dug-out canoes, for which it is specially suited since it is easily worked and is light. In this capacity the tree did yeoman service in the early Indian wars of the South. In 1779, an attack upon the Carolina

food stuffs, and for refrigerators. Its straight grain adapts it to the making of matches, and the ease with which it takes glue makes it useful as a core wood upon which more expensive veneers can be placed. It makes a very good paper pulp.



THE TREE IN WINTER.

A TULIP TREE IN ROCK CREEK PARK, WASHINGTON, D. C., SHOWING FLOWER CUPS.

frontier was threatened by Indians who assembled near Chattanooga. Isaac Shelby, one of the pioneer leaders, had 5-foot trunks of yellow poplar hewed into canoes, in which he took his 750 men down the Holston River to attack the tribes.

The wood lacks odor, and this quality permits of its extensive use for containers for butter, cheese, and other



A TULIP TREE.

THIS TREE IS IN PIKE COUNTY, OHIO. NOTE THE MANNER IN WHICH THE BRANCHES SPREAD.

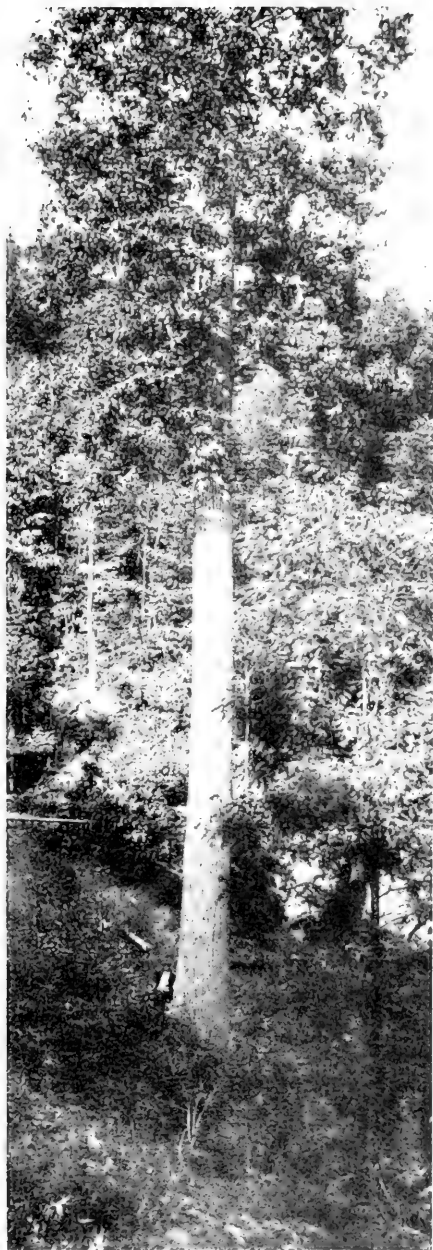
The tree grows best on a good, moist soil; when grown on dry soil the wood is likely to be harder and to consist largely of light-colored sapwood. It will not pay, however, to grow it on rich agricultural bottom lands, which will bring higher returns from the cultivation of farm crops. For timber production, therefore, it should be grown upon the slopes and coves between the bottom lands and the dry heights.

The days of the old trees are numbered, and, for this reason, it is desirable to pay more attention to the second growth. The second growth, though not to be compared with the old giant trees, which are practically all heart-



A MAGNIFICENT TREE.

THIS TULIP POPLAR IS IN CENTRAL MARYLAND AND IS A SPLENDID SPECIMEN. NOTE THE EXTENT OF ITS BRANCHES AND ITS GREAT VALUE IN ITS PARTICULAR LOCATION AS A SHADE TREE.



YELLOW POPLAR.

THIS IS WHAT THE TREE IS CALLED IN MANY SECTIONS. THE PHOTOGRAPH WAS TAKEN IN LEE COUNTY, VIRGINIA.

wood, still makes valuable lumber. So far as known, the tree is not subject to severe injury either from disease or insects. Its chief enemy is the one



BIG TULIP POPLAR.

NOTE THE STRAIGHTNESS OF THE TRUNK AND COMPARE SIZE WITH FIGURE OF MAN AT THE BASE OF ADJOINING TREE.

common to all forest growth in the Southeastern States—fire.

One important point particularly accentuated in the report is that poplar stands should be properly thinned. Such thinnings should yield a money return and at the same time increase the value of the stand when it matures. In thinning the aim should be to give the tree

plenty of room for light and growth, and this will mean fewer trees, each one with a large value, rather than many small trees of less value. This is shown strikingly in the report, which says that it will be far more profitable to have 70 trees on an acre with average diameters

of 20 inches than 160 trees with diameters of 15 inches. The 20-inch trees have a stumpage value of \$3.61 each, while the 15-inch trees have a stumpage value of only 83 cents apiece. The acre of larger trees, therefore, will be worth about \$120 more than the other.

BETTER FOREST FIRE LAW

By WILLIAM R. FISHER

TWO supplementary acts were passed by the last General Assembly of Pennsylvania, which are expected to add materially to the efficiency of the forest fire protective service of the State.

Act No. 432 provides for a system of fire patrols under the joint co-operation of the Department of Forestry and private fire protective associations. The cost of maintenance is to be equally divided between the two parties to the agreement, and the private organizations which avail themselves of the benefits of the law are required to make an annual report upon their activities to the Department. This official recognition of the private fire protective associations under the law will give them higher standing in the estimation of the public and increase their importance and their influence.

Another Act (No. 414) tends in the same direction, and its effects will surely bring into closer relation the private associations and the State Department of Forestry. The act authorizes the Commissioner of Forestry to assign foresters to duty as district foresters in such counties as, in his judgment, "the demands of forestry warrant." It then becomes the business of the district forester to bring the uses and purposes of practical forestry to the attention of the people, to collect data and to assist owners of forests and woodlots; to conduct experiments, to assist in Arbor Day work, to inspect and report to the Forestry Department upon the work of the fire wardens, and "to promote and advance any other

activity in local forestry that may be designated by the Department of Forestry." This comprehensive phrase will enable the Department to give a wide range to the functions of the district forester.

Under the act the Pocono Protective Fire Association asked for the appointment of a district forester for Monroe County, and the Commissioner promptly responded to the request. The need of local State officials to look after the work of fire wardens has been plainly urgent for a long time, but hitherto there has been no provision under the law for supplying the want. This act furnishes an effective agency for the desired object.

Before these important additions to the machinery of forest fire protection were brought about, the people of the State were, in some respects, not so well protected against forest fires, under the existing law of 1909, as they had been under the old law. In former times each county bore the expense of whatever forest fires broke out within its borders. The township constables were the fire wardens and the County Commissioners paid the bills. So in this way, the burden of the cost for fire-fighting fell upon the county which was immediately concerned in the fire losses.

Under the present law, however, the State Commissioner of Forestry is the Chief Fire Warden and has charge of the suppression of forest fires all over the State. Every two years the General Assembly makes an appropriation to cover the estimated expenses of taking

care of forest fires until it meets again, guessing at the amount that will be needed. Here is one of the weak points in the system. No one can tell beforehand about the extent of forest fires. Sometimes the guess is too high, and sometimes it is too low; and when the appropriation is exhausted before the time arrives for which it was set apart, the whole State must needs go without fire protection until the Assembly meets again, and a new appropriation is made. And, again, if one part of the State suffers extensively from fires, the money appropriated for the benefit of the whole body politic may have to be spent in that particular section, to the detriment of the remainder. While there is no remedy at present for this awkward and dangerous situation, a condition which has actually existed and on one occasion has placed the Commonwealth of Pennsylvania without forest fire protection for a period of eleven months, yet we may take much comfort and satisfaction from these two supplementary acts which were passed by the last Legislature, and look forward with confidence to further improvement in the laws, later on. It is a gain for the private associations to have recognition

by the State and to be able to co-operate with State authorities in patrolling places of danger, but the great step in advance is the privilege which each county now has to provide itself with a competent State official to take charge of the fire wardens and to regulate their actions. Fire fighting, like everything else that is worth while, requires knowledge and experience. A trained man will do much more than ten greenhorns: a section gang from a railroad, who are used to working together and have been taught to obey the orders of the foreman, will put out a fire much quicker than fifty farmers who turn out in response to an emergency call. Where there is no discipline a great many stand around and do little or nothing except to turn in their time of loafing and draw their pay.

We really need trained fire fighters as well as trained fire wardens to direct them, but it is too much to expect such perfection at the present time. We are content with the good prospect of having competent men of intelligence and experience to act as wardens throughout the heavily wooded portions of the State.

WARNINGS AGAINST FIRES

POST cards cautioning forest users in the Appalachian region against setting fires in the woods have recently been sent by the Federal Forest Service to residents in the vicinity of the forest areas which have been purchased by the government.

These post cards state that burning of the woods does not improve the grazing, and does not exterminate poisonous insects or animals. On the other hand, the cards say such burning injures the grazing value of the land by killing off the better grasses, by decreasing the fertility of the soil and by increasing the possible damage to the ground, and its covering of vegetation, from frost, sun, wind and rain. Furthermore, they state that burning injures the timber, impairs its merchantability, and lowers its selling price; that it increases insect damage

by weakening the vitality of the trees and affording an entrance for insects through the fire scars, and, in addition, that it kills out the young trees which are just getting started.

For the reasons enumerated, it is announced that no grazing will be allowed on the government lands which have been recently burnt; the rule being enforced in order to give the range a chance to recuperate from the effects of the burning. The effect of this prohibition will be to close certain areas against grazing; therefore fires set through a mistaken notion that they will improve grazing, will curtail the forage resources.

The cards further ask cooperation of all forest users in the prevention and control of forest fires.

HOW WOULD YOU DO IT?

SUPPOSING you were seventy-five miles from the base of supplies and having but four pieces of rope, the longest 100 feet, two double and one single 6-inch sheave blocks, axes, two-man saws, hatchets, crowbars, lineman's climbers and a brace and bit, it became necessary to immediately erect a fire lookout tower 100 feet high, what would you do?

That is the problem which confronted some Forest Service men in the Sitgreaves National Forest of Arizona a short time ago. This forest, covered with tall timber, has no good natural lookout points. It therefore is necessary to build towers tall enough to overtop the high trees.

Mr. Bristow Adams, of the Forest Service, tells of how the problem outlined in the first paragraph was solved. He says:

"A triangulation station was needed on the Chevalon District, and having in mind several points upon which the timber was only 35 to 40 ft. in height, it was planned to build where a 40 to 50 ft. tower would be sufficient. Accordingly, such tools and rigging as were at hand were thought to be adequate, and they would have been for the construction of a tower of the size we expected to build.

"It was found, however, that there was only one point from which a satisfactory view over the forest in all directions could be obtained. Unfortunately, the timber was so tall there that it was

evident that a tower must be over 100 ft. in height to be of any use.

"The dangerous fire season was near at hand, and we were 75 miles from any base of supplies, so it was decided to build the tower with what tools and rig-

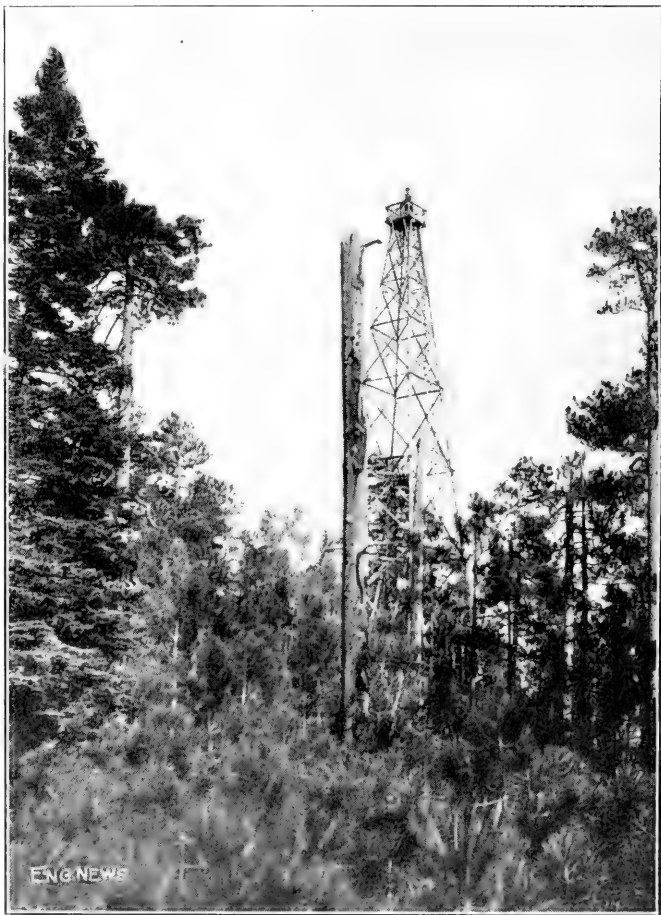


FIGURE 1. PROMONTORY BUTTE LOOKOUT TOWER, SITGREAVES NATIONAL FOREST, ARIZONA.

ging we had. We had only 300 ft. of $\frac{3}{4}$ -in. rope in four pieces, the longest being 100 ft. in length; two double blocks 6 in. long and one single-sheave block of the same size.

"Our tools consisted of axes, two-man saws, hatchets, crowbars, two pairs of lineman's climbers and belts, and a

brace and bit. Telephone wire was used for guys.

"The crew was made up of temporary employees and two rangers, under the direction of one of the forest rangers. At the start there were eight men, including one cook, one teamster, and the man in charge. By the time the tower was half built the crew was cut down to four men.

"The first task was to cut and peel the timbers and skid them to the spot where the tower was to be erected. Much care was necessary in selecting the main poles, some of which were skidded out of dense thickets. Altogether, over 2,600 lin. ft. of poles was used. The dimensions of the tower are as follows: base, 30 ft. square; platform top, 6 ft. square; height, 115 ft.

"The main corner poles averaged 16 in. in diameter at the butts and 4 in. at the tops. They are spliced at heights of 45 ft. and 100 ft. Each splice is bolted and then bound with bands of telephone wire (see Fig. 3). The timbers are fastened together with $\frac{1}{2}$ -in. lagscrews. The floor is constructed of 2x6-in. lumber and the rail is of 2x4-in. and 1x4-in. lumber. With these exceptions, no sawed lumber was used in the tower.

"In raising the poles a tree nearly 100 ft. in height was used as a derrick mast; but since the top of this tree was not stout enough above a height of 75 to 80 ft. to carry much weight, some difficulty was experienced in placing the 55-ft. poles upon the tops of the 45-ft. ones below.

"With an abundance of rigging, a

derrick boom could have been rigged, which would have simplified the work to a great extent; but it must be remembered that we had only three pulley blocks, and they had to be used in hoisting each pole or brace. We were so short of rope that when we raised the second length of the main poles, it was necessary to hoist until the blocks came together, lash the pole so that it

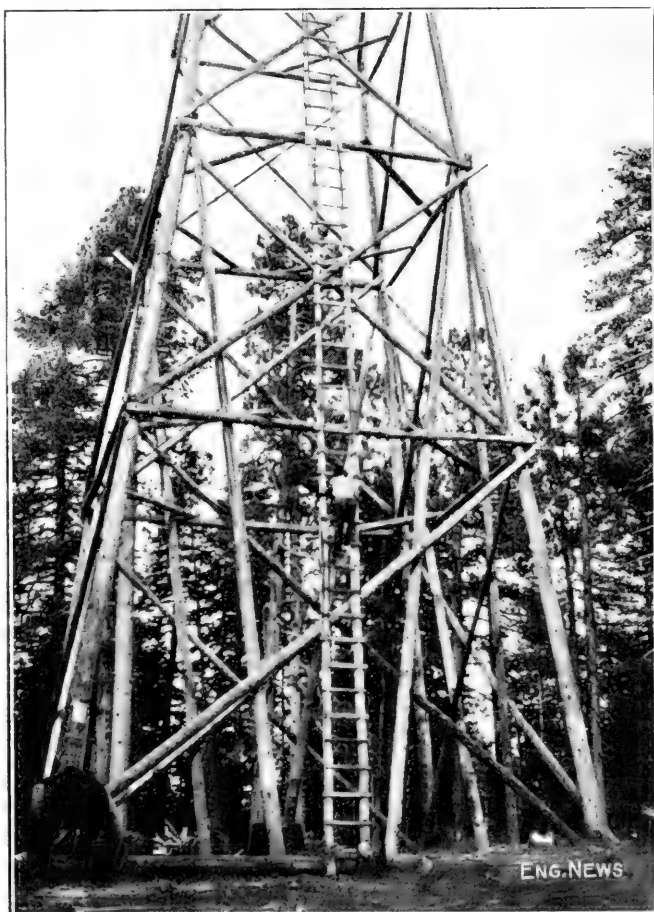


FIGURE 2. LOOKOUT TOWER SHOWING METHOD OF FRAMING.

could not fall, and then stretch the tackle for another pull.

"The men of the crew had no previous experience in building towers and were by no means expert climbers at first, but they improved rapidly, so that before the tower was completed, several of them were excellent men for high work.

"The first poles were cut on May 21, and the tower was completed and in use on June 20. The time spent in cutting and peeling logs and constructing the tower amounted to less than 24 working days of 8 hours each, for a crew which averaged five in number. In addition, a two-horse team was used 9 days.

"Four galvanized-wire cables $\frac{1}{2}$ in. in diameter will be added as guys. A copper cable reaching up and over the center of the tower will follow one leg to the ground and serve as a lightning arrester."

Apache Forest News

During 1913, 28,570 head of cattle and horses were grazed on the Apache Forest under permit. The average number for each stockman was only 138 head. The Forest has a greater number of trout streams than any other National Forest in either Arizona or New Mexico.

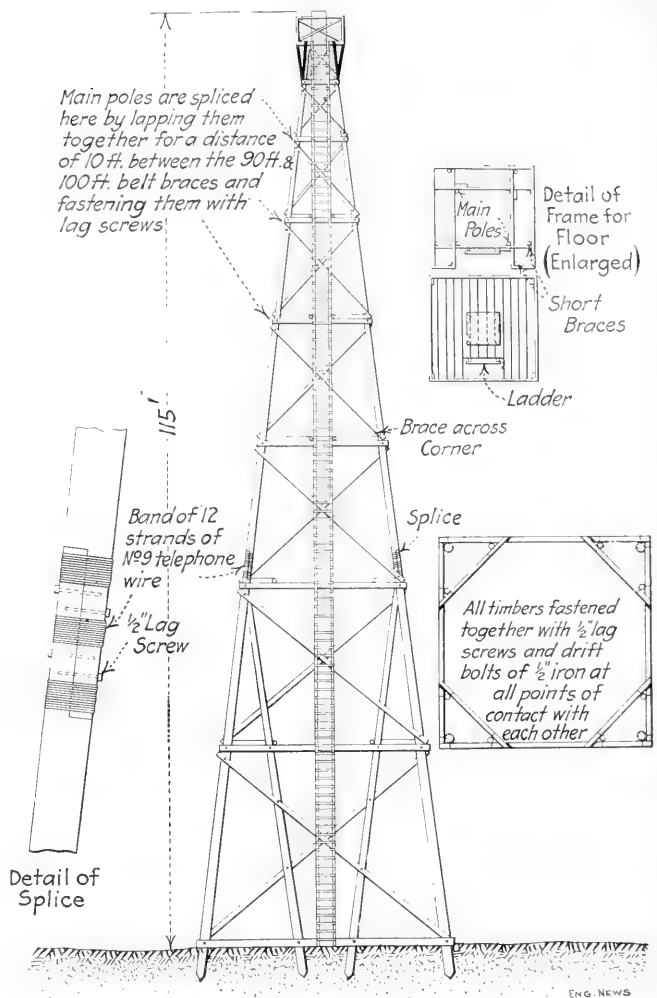


FIGURE 3. STRUCTURAL DETAILS OF THE PROMONTORY BUTTE LOOKOUT TOWER AND TRIANGULATION STATION.

Pictures in this article by courtesy of the *Engineering News*, New York City.

Reforestation for \$7.50 An Acre

Nearly 4,000 acres were reforested in Montana and northern Idaho during 1913, at an average cost of \$7.50 an acre.

China's Best Forest

The best forested area of China is in Manchuria. The principal tree varieties are pine, cedar, larch, fir, yew, oak, ash, elm, walnut, and birch.

Valuable Instruction

Two forest officers, in Washington and Oregon, are writing popular descriptions of the trees on the Crater and Mt. Rainier national parks, for the use of visitors to the parks.

Wyoming's Highest Mountain

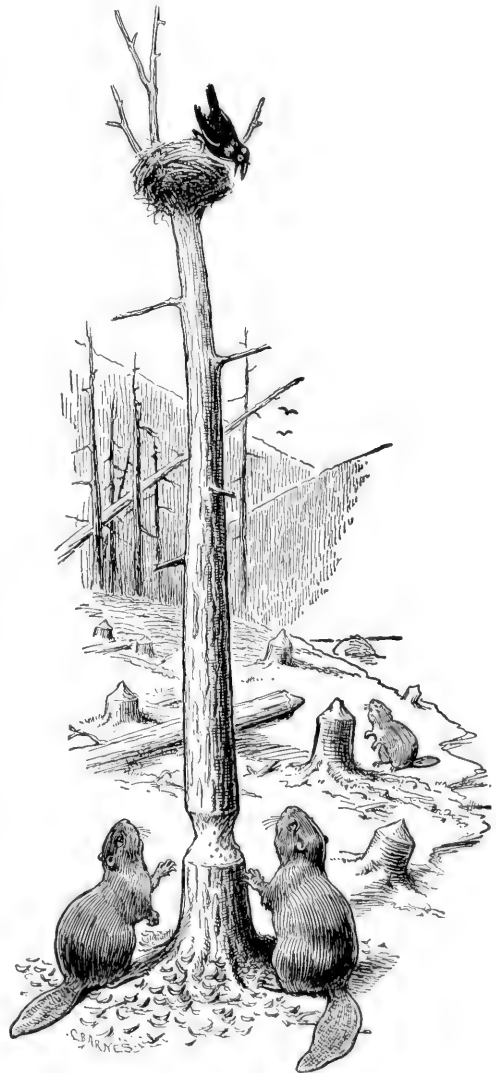
Gannett Peak, Wyoming, nearly 14,000 feet in elevation, and the highest mountain in the State, is on the divide between the Bonneville and Bridger national forests.

THE FOREST PRODUCTS EXPOSITION

OPENING on April 30 at the Coliseum, Chicago, the Forest Products Exposition is now well on its way to the success which the careful plans of the promoters and the enthusiasm of the exhibitors assured. There was to be seen not only every wood in commercial use in the United States but exhibits of every branch of the forest products industry, and in addition, and of particular importance, were the exhibits of the United States Forest Service, the American Forestry Association, the American Wood Preservers' Association and the Western Forestry and Conservation Association, showing as they did the value of the best utilization of the forests, of the preservation of wood and of the conservation of forest lands and the protection of timber. The thousands of daily visitors not only had entertainment, for the exhibits were a delight to the eye, but they had brought home to them what perhaps many did not realize before, the great economic importance of the forests, the need of their care and development and the very many uses to which wood may be put.

The educational and the industrial value of the Exposition, it soon became apparent, was even greater than had been anticipated. Teachers and school children from all the schools of Chicago flocked to the display; the general public found unusual interest in the various features, while the contractors, architects, builders, and the men of numerous vocations directly or indirectly concerned in wood and its uses found much of practical benefit to them. It is early to speak of the business-getting value of the Exposition, but as advertising gets business, and as there could be no better advertising than the exhibits with their many very attractive features, it is apparent that the exhibitors will be amply repaid for their expenditure in cash and in effort.

The Exposition will open at the Grand Central Palace, New York, on May 20 and continue there for ten days.



Crow: SAY, DON'T YOU KNOW IF YOU CUT DOWN ALL THE TREES BY AND BY YOU WILL HAVE NO WATER FOR YOUR HOMES?

Published by courtesy of Life.

26,000,000 Trees Planted

Norway has 144 tree-planting societies. The first was founded in 1900, and since then 26 million trees have been planted, more than 2 million having been set out last year.

GAME AND FISH INCREASE

By PROF. D. LANGE,
Superintendent of Schools, St. Paul, Minn.

THERE is no region in the world where the hunter or camper, or the general lover of outdoor life may find such absolute freedom as in our own North Woods, and if the resources of this great country, which equals about the whole of Great Britain, were better known, the people of St. Louis, Kansas City and Omaha, in fact all the inhabitants of the Mississippi Valley, would resort to our own North Woods, just as the people of Europe flock in hundreds and thousands to the Alps.

I should like to call attention to the possibility, and, as I believe, to the necessity of encouraging the domestication or semi-domestication of game and fur-bearing animals.

Although it is an axiom of game protection that wild game cannot be sold on the market, it seems ridiculous that in this young country, where we still have such abundance of game, and such enormous areas of wild land, it is practically impossible to buy game, while in such old countries as Germany and England venison can frequently be bought at least as cheap, if not cheaper than, beef. The answer is that in Germany and England a great deal of game is kept in a state of semi-domestication.

It appears that the greatest lure to the North Woods are the fish, which still teem in the countless lakes.

I believe the time has come when a careful study should be made of the fishery resources of Minnesota in International as well as in State waters. I believe that with scientific management the production of one of the most wholesome food supplies could easily be

increased ten or a hundredfold in this State, but the thing that is most needed is a careful, scientific study of the conditions governing the fish life in the several large bodies of interstate and international waters.

For instance, how could the fisheries in Red Lake and Mille Lacs be made most productive? What would be the best methods of utilizing the fish in the Minnesota River and in the interstate waters of Lake Pepin, the Mississippi and St. Croix Rivers, and in the international waters of Lake Superior, Rainy River, Rainy Lake and Lake of the Woods? The sturgeon of Lake of the Woods have become comparatively scarce and small, and as yet no method is known for their successful propagation.

The same statement is true of the spoonbill found in the Mississippi and the Minnesota, and which once was exceedingly common in Lake Pepin, but has now become rare. Of this fish no successful method of propagation is known.

It may be news to some of my hearers that there is one fish inhabiting Minnesota lakes and rivers which goes to the ocean to spawn. That is our common eel. When the eels are sexually mature they migrate out of the rivers to the ocean and spawn there.

I believe that a systematic study of the fishery question would discover some way by which our fish resources can be commercially utilized without infringing in any way upon the rights of sportsman, which, of course, should be respected.

In Charge of Field Work

Mr. Kenneth M. Clark, of the James W. Sewall office of Old Town, Me., has obtained two months' leave of absence, during which time he will take charge of the field work in timber estimating and surveying for the Harvard Forest School.

THE SOUTH'S FORESTRY AND WATER RESOURCES*

By HENRY S. GRAVES, *Chief Forester.*

THE South today is standing on the threshold of a vast industrial development. The extent of this development and, consequently, the advancement and prosperity of the South itself, depends very largely on two factors: the production of raw material from the farms, forests, and mines, and the protection and development of water resources. The South is preeminently favored in both these respects. It is not merely the great amount of navigable waters stretching far back into the different States, available for cheap transportation, but vast water powers which are rapidly transforming the South into a manufacturing as well as an agricultural section.

The development of the greatest usefulness of these water powers is most intimately bound up with the preservation and protection of the forests at the headwaters of the streams. Of the total estimated potential water power in the United States (36,900,000 horse-power), 11 per cent is found in the Southern Appalachians. In North Carolina, South Carolina, and Georgia alone there are about 1,321,000 potential horse-power, of which so far only 32 per cent, or 429,000, are actually developed and are being utilized.

In the southern mountains there is one factor that far overshadows all others. The danger from erosion is peculiarly great in the Southern Appalachians, because the region has a very heavy rainfall, and as soon as the soil becomes exposed it erodes quickly and violently. Furthermore, the ground in this region is bare of snow during all of the year except a few weeks in winter, and is therefore subject to the action of water during practically the entire year.

Still another condition which tends to increase erosion in the Southern Appa-

lachians is the extreme frost action. The ground freezes at night to the depth of an inch or so, and a layer of soil from 1 to 1½ inches is lifted from the surface by columns of ice. In the daytime the melting ice lets the surface earth back into place again. This process constantly at work allows the heavy rains to remove readily the loosened soil from the exposed slopes.

Because of the lack in the South of natural storage in lakes and marshes, the washing away of the soil from the mountains removes the only natural storage reservoir for the flood waters and thereby decreases the amount of power that can be developed continuously throughout the year. Some of the Southern rivers, like the Roanoke, which rise in the mountain regions have, as it is, extremes of high and low waters. This condition is due to the lack of natural storage basins, and these rivers would become entirely uncontrollable and practically useless for water-power development were the natural protective cover at the headwaters to be destroyed.

Injudicious timber cutting in the mountains, forest fires which usually preceded, accompanied and followed lumbering, and above all the clearing of high mountain land for agriculture, followed by improper methods of cultivation, all these things together have brought about erosion in the mountains which already has produced evil consequences.

SOIL GOES INTO THE STREAMS

The soil washed from the mountain fields goes into the streams. The destruction of farm land in the valleys is enormous, especially during wet years. In 1901, the estimated damage by floods in the valleys of the rivers flowing from these mountains was \$10,000,000. The finer eroded material is carried down

the stream and deposited where the current becomes checked; and especially in the reservoirs constructed for water-power use where the water is quiet and therefore the silt most easily deposited. This fine silt is deposited also in the navigable portion of the stream. This necessitates constant dredging to keep the stream open for navigation.

The process of denudation of the mountain slopes already has seriously affected the capacity of the Southern streams for water-power development. One prominent Southern engineer has estimated this to be at least 40 per cent. Apart from the menace to the water powers, the washing away of the soil from the mountains and from the fields in the Piedmont region is a very real danger to the water supply of the cities and towns both from the standpoint of quantity and quality. Fifteen years ago the streams in this region carried far less sand, silt, detritus, and washings than now. These have been filling up the channels and increasing enormously the expense and difficulty of purification so that many cities now face not only a shortage of water during the lengthy drought periods, but unknown dangers in the water which they do get. As an example, the city engineer of Augusta, Georgia, stated in 1908 that their power canal had received more silt in the last 18 months than in all the 30 years previous. If this is the case with only a portion of the mountain slopes denuded, what will be the plight of Augusta and other cities similarly situated when the bulk of the forests is gone?

In the Carolinas and in Georgia alone over \$50,000,000 is now invested in cotton mills run by water power directly or by electric power generated therefrom, and this is only the bare beginning in electrical development. The 2,000,000, or, as some claim, 3,000,000 horse-power available in the streams that flow from the Appalachians to the Atlantic, when developed, would mean an investment in hydro-electric plants of upwards of from \$200,000,000 to \$300,000,000, earning annually from \$40,000,000 to \$60,000,000 at a conservative estimate, and saving the South on

its coal bill alone some \$15,000,000 to \$20,000,000.

FORESTRY ONLY A PART

Obviously, we do not advocate maintaining a forest cover on the entire watersheds of our rivers. Lands suitable to agriculture must be devoted to that purpose, but there should be better methods of farming which will prevent erosion and will utilize a larger amount of water through increased absorption of the soil and increased crop production. My plea for forestry is mainly in the mountain regions on those areas of no permanent value for farming and situated most critically for watershed protection.

The total forest area of the Carolinas and Georgia is estimated at present at 75,000,000 acres. North and South Carolina have each 19,000,000 acres, and Georgia 37,000,000 acres.

Not less than 30 per cent of this area, or about 25,000,000 acres, should be permanently kept in forest for the protection of the streams that rise in the Appalachians. Of this protective forest 9,000,000 acres should be in North Carolina, 6,000,000 acres in South Carolina, and 10,000,000 acres in Georgia. Within this area there are about 2,000,000 acres on critical watersheds that will be in need of reforestation.

Serious injury to the industrial development of the South can be prevented by adopting right measures now. The National Government has recognized the public character of the problem in an extensive purchase of forest lands on the headwaters of navigable rivers. The National Forest Reservation Commission has approved the purchase of 120,706 acres in North Carolina, at a total cost of \$924,589; of 23,286 acres in South Carolina at a cost of \$128,157, and of 96,132 acres in Georgia at a cost of \$622,654. These Government forests, however, as you can readily see, will form only a very small portion of the forest area which must be protected. The work of Government purchase is confined to the protection of navigable rivers. A considerable number of States have made

a beginning to meet this problem. No State is doing its full duty in forestry. The Federal Government is giving assistance to the different States in the work of fire protection on the watersheds of navigable streams. Approximately \$100,000 a year is expended in giving such assistance. It is a requirement, however, that no money can be expended for this purpose unless the State has established a system of fire protection and is appropriating for the actual work of protecting those lands an amount equal to what the Federal Government is prepared to allot. It has been the earnest wish of the Forest Service that more of the Southern States could secure advantage of this Government aid.

CONTROL OF WATER RESOURCES

Without any question, the problem of control of our water resources is one of the most important problems of internal development of the country. In many instances, streams are becoming more irregular every year. In nearly every part of the country the use of water resources is becoming more and more intensive.

A good deal of work has already been done upon our rivers. One of the greatest needs today is that the different activities essential for permanent improvement of rivers be brought into correlation and be conducted in accordance with a comprehensive plan. There have been enthusiasts who have asserted that the protection of forests would be sufficient to control floods. In my opinion, those persons who assert that any one method will meet the situation are wrong. Conditions necessarily vary, the needs of the different streams neces-

sarily vary; but in any case a real control of stream flow can be secured only by a comprehensive plan which makes use of all the different influences which affect control of water, levees where these are necessary, reservoirs where these are necessary, the protection of forests at the headwaters of streams, etc.

It is as ridiculous for a forester to claim that reforestation alone would prevent floods and bring about improvement of the rivers as it is for an engineer to claim that levees and drainage by themselves can work permanent improvement in our rivers. The engineer and the forester must work hand in hand if our river system is to be converted from a source of danger and expense to one of the highest usefulness.

There are some engineers, and very prominent ones, in this country who claim that neither the construction of reservoirs nor forestation can have any effect whatever upon the navigation of the river. They claim that navigation can be effectively regulated by channel improvement only. Yet history all over the world and experience in our own country shows how futile this method is to bring about permanent improvement in our rivers. Regulation of flood waters by channel improvement has been so far the only method used in the attempt to control our rivers; and the results speak for themselves. In the older countries it was found out many years ago that improvement of navigation near the mouth of the river is merely a temporary expedient. If permanent improvement is to be accomplished work must begin up the stream, not down. Regulation must begin at the source. Floods must be prevented, not cured.

* From an address before the Tri-State Water and Light Association, at Atlanta, Ga., April 16.

Importing Norfolk Island Pine

Ghent, Belgium, furnishes practically all of the potted specimens of the symmetrical *Araucaria*, or Norfolk island pine, used as an ornamental foliage house plant, in Europe and America. The United States imports at least 250,000 of these plants in 5 or 6 inch pots each year.

WHITE MOUNTAIN WINTER WORK

FORESTERS who have just returned from winter work in the White Mountains of New Hampshire report that, while some hardship is entailed, as much can be accomplished in the dead of winter as in summer.

In most of the Government's field services it is usually thought best to work in the north during the summer months and in the south during the winter, the idea being to do the work with the least difficulty. In appraising lands for purchase under the Weeks law for the eastern national forests, however, the Forest Service has had to disregard latitude and season because it was necessary to expedite the work in the north. During the past winter two camps of men have been estimating and valuing the forests which the Government contemplates purchasing on the slopes of the White Mountains.

Because of the softness of the constantly falling snow, the work was done mainly on snow shoes. At times the temperature has been around 20 degrees below zero for considerable periods, and the parties now in report some occasions when the thermometers registered nearly 40 degrees below. The crews were housed in winter camps like those of the lumberjacks, and in order to make full use of the short winter days they were out by daylight and did not return until dark. The work of the crews required continuous walking. Diameters of trees were measured and the number of logs estimated in all merchantable trees growing on parallel strips 4 yards wide and 40 rods apart.

From these estimates the full amount of timber was calculated.

One man, the crew leader, used a compass to keep the men in the desired direction, mapped the country traversed, kept account of the distances covered as determined by actual measurement, and recorded all the information regarding timber. The other members of the crew measured the timber and gave their figures to the leader, who tallied them. The actual work, however, did not end with all-day climbs through snow on the mountainsides, with frequent exposure to the sweep of winds on the higher ridges and divides; during the long winter evenings, or on days when the snow storms were so severe that outside work was impossible, the figures gathered were tabulated and the information grouped, so as to show the quantities of timber suitable for various products, such as saw timber, spruce for paper pulp, or birch for spool making. During the whole winter, however, it was noted that stormy days caused no more loss of time than in summer, and the health of the men in the party was, as a rule, better than in hot weather.

It is said that the men became quite inured to the cold and liked it, one of the principal advantages being the absolute freedom from insects, such as gnats and mosquitoes. While these same crews might appreciate an assignment to the same region for the following summer, those who have the work in charge say it may be the lot of these same men to be assigned to the pine regions of the south during the hottest weather of August.

Indian Fire Patrolman

The Canadian government is using Indian fire patrolmen to protect the forests of northern Manitoba.

Walnut For Gun Stocks

A Pennsylvania gun company is using the waste pieces of black and Circassian walnut, left after veneer cutting, for gun stocks.

LODGEPOLE PINE FOR POLES

LODGEPOLE pine, of which there are abundant stands in both the Rocky Mountain and coast ranges, when treated with preservatives, ought to serve in the place of red cedar as a pole timber, says the Department of Agriculture in a bulletin just issued on Rocky Mountain woods for telephone poles.

The rapid extension of telephone and power lines in the west is making the question of pole supply one of increasing importance. Western red cedar, for long the standard pole timber of the western States, grows only in Washington, Oregon and northern Idaho, and in the States south of that region its cost is high, owing to the great distance over which it must be transported. In addition, the heavy drain on the supply promises to result in increasingly higher prices.

The tendency of the lodgepole pine to decay rapidly when in contact with the ground, has so far kept it out of the field as a competitor of the cedar, according to the department, but the general adoption of preservative treatment by railroad and telephone companies changes the situation. At an additional cost for treatment that still leaves the pine pole the cheaper of the two in most markets outside the cedar

region, states the department; the pine may be made to last longer than untreated cedar. Tests carried on at the forest service laboratory also showed lodgepole pine to be as strong as the cedar, if not actually stronger.

Fire-killed lodgepole pine, of which there is a vast quantity in the Rocky Mountain region, showed a strength under test 80% that of live red cedar. In elastic values, the two were practically equal, and in stiffness, fire-killed lodgepole pine is quite comparable to the cedar. The prejudice against the use of fire-killed material is a mistaken one, says the department, for there is no inherent difference in wood seasoned on the stump and wood cut when green and then seasoned. On many areas such material remains entirely sound for a number of years after the fire which killed it, and besides is thoroughly seasoned and thus ready for preservative treatment as soon as cut.

Engelmann spruce is another Rocky Mountain tree which the department suggests might be used for poles. It is not as strong as lodgepole pine, nor does it take preservative treatment as well, but it grows farther south, and in many districts is the only local timber available for pole use.

No Forest Fires In Ten Years

The tenth successive year without a forest fire has just been passed by the Powell national forest in south central Utah.

The Poplar's Growth

Yellow poplar, or tulip tree, the largest broadleaf tree in America, has been known to reach nearly 200 feet in height and 10 feet in diameter.

Pennsylvania's Timber Holdings

Pennsylvania has about 7½ million acres of timberland, one-eighth of which is owned by the State. The total value of the State's timber is 139 million dollars.

Montana's Highest Mountain

The highest mountain in Montana, Granite Peak, with an altitude of nearly 13,000 feet, is in the Beartooth National Forest.



EDITORIAL

FIFTEEN States are without laws providing for a State Forest administration. These fifteen States are lacking in one of the most important measures a State can take for the prosperity, the comfort, the health and the recreation of its citizens. Without the organized care and development of the forests and the woodlands of these States which an efficient State forest administration would assure, their forests and woodlands are deteriorating, there is wasteful use of their timber; lack of proper fire protection and an absence of the popular instruction in care of forests, woodlands and trees which it is part of the duty of State forest administrations to give to the people.

A short time ago the American Forestry Association sent representatives into Virginia and urged the people there to demand, and the members of the legislature to pass, a forestry law. Such a law was passed. It will go into effect on June 1. It is not extravagant to claim that this law will result in saving to the State millions of dollars yearly as well as conserving the trees of the

State, in forest, woodland and community, and thereby adding greatly to the beauty of the land and the health and the pleasure of the people.

The States in which there is no law providing for a State forest administration are: South Carolina, Georgia, Florida, Mississippi, Texas, Arkansas, Missouri, Illinois, Nebraska, Wyoming, Utah, Nevada, Arizona, New Mexico, and Oklahoma.

The American Forestry Association is about to commence in each of these States a campaign for securing forestry laws. The people will be told what such forestry laws mean to them, and they will be asked to urge the members of their legislatures to give serious consideration to the advisability of passing such laws. The Virginia Senate voted unanimously for the Virginia law, and the House passed it by a vote of 86 to 3. No member of a legislature having at heart the interests of his constituents can ignore the necessity for a forestry law, whether his constituents live in a dense forest, on land from which timber has been cut, or on land where timber never grew.

DEMAND for forest conservation in Texas is so great that the movement to secure a State forestry department and a State forester has been endorsed in vigorous resolutions by the Houston Lumbermen's Club and the Lumbermen's Association of Texas. Officials of these two powerful organizations are de-

termined to use every energy to further the agitation for a forestry law. They will dwell particularly on the importance of fire protection. Last year was one of the best seed years for long-leaf pine known in the State. As a result of Nature's wide distribution of the seed and favorable weather conditions, thousands of acres of long-leaf

pine forests are now carpeted with these little seedlings, and it is most important that they be protected from fire.

It is highly gratifying to know that the lumbermen of Texas are so wide-awake and progressive that they realize the advantage of forest conservation to

such a degree that they are willing to give carefully planned effort to achieve it. Texas is one of the fifteen States which still are behind the times as far as the preservation and the protection of her forests is concerned.

NEED of protection against forest fires is impressively apparent upon reading in the *New York City Globe* of April 15 that on the day before there were three forest fires in New York City.

One fire licked up a 200 by 200 foot patch of trees and underbrush on the grounds of the House of Mercy at Inwood-on-the-Hudson. Another swept through 100 acres of woodland on the

west side of Emerson Hill, Staten Island. The third threatened the village of Egbertville, Staten Island.

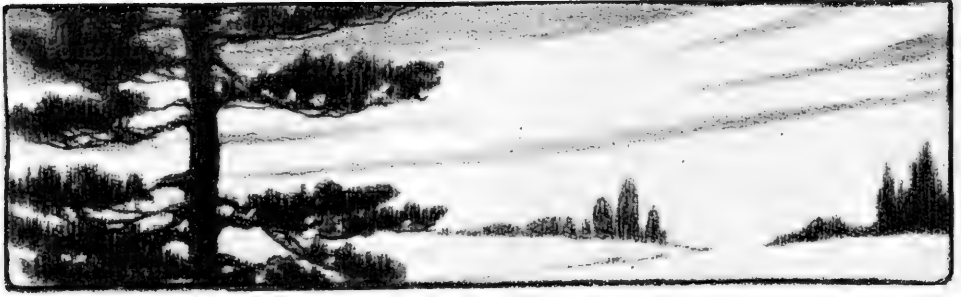
If such fires can occur and do damage in the largest city in the United States, what may not be done by forest fires in the depths of forests hundreds of miles from any habitation? Who says that there is not need of forest fire prevention?

FITTING tribute was paid at Harrisburg, Pa., on May 4 to Dr. J. T. Rothrock, one of the most enthusiastic and able promoters of forestry in the United States, the occasion being his retirement from service in the Pennsylvania Forestry Commission, of which he had been an active member since its formation. His numerous friends and admirers, wishing to show their appreciation of his many years' devotion to the cause of forestry and the highly important results of his enthusiastic work, tendered him a luncheon and presented him with a testimonial cup. Dr. Rothrock in 1886 became secretary of the Pennsylvania

State Forestry Association, and from that day to this has given energy and his devotion to the cause of forestry. He was the first State Forest Commissioner for Pennsylvania, was for many years a member of the State Forestry Reservation Commission, and has also been for many years a vice-president and a most valued member of the American Forestry Association. Dr. Rothrock is esteemed not only in Pennsylvania but throughout the United States as a teacher and a leader in the cause of forest conservation, and not only those who attended the dinner but thousands of others sent to him expression of their appreciation of his splendid work.

FOR the next decade in this country lumbering and wood utilization will be more important phases of forestry than reforestation or the reproduction of the forest. The forester must know how to get his products out of the forest and to the market not only in the cheapest way but in a way that will leave the forest in the best condition for the production of a future crop. After

the logs are out of the woods the forester must understand how to utilize the lumber produced so as to make the largest profit. Statistics show that today less than 50 per cent of the raw products of our forests are actually utilized, and the problem of more complete utilization is being taken up not only by the forester but by lumbermen and wood users throughout the country.



FOREST NOTES

During March twenty-five forest fires burned on or near the land in the southern Appalachians, which the Government is securing under the Weeks law for the establishment of national forests. Seven of these fires reported by the Government's forest officers covered more than 10 acres, but 11 were less than one-quarter of an acre in size.

The most common cause was railroad sparks. On what are known as the Cherokee, Mt. Mitchell, Unaka, and White Top areas the railroads cross lands which the Government is acquiring, so that there is considerable risk, even though the rights of way are patrolled during very dry seasons. The State laws, however, are so lax in regard to the maintenance of spark arresters and keeping the railroad rights of way clear of inflammable material that, the foresters estimate, more than half of the total number of fires occurring during March were probably set by railroad locomotives.

Six out of the 14 areas in which the Government is purchasing lands reported fires during March. Except for the White Top area, which is on the border line between Virginia and Tennessee, all the areas from which fires were reported are in North Carolina, South Carolina, Tennessee, and Georgia.

An investigation to determine the advisability of growing basket willows in the low-lying lands along the South Carolina coast has recently been started

through cooperation between Clemson Agricultural College, the office of Farmers' Cooperative Demonstration Work, and the Forest Service of the United States Department of Agriculture.

Much of the low-lying land in this region has previously been used for the production of rice, but several factors, including the development of new rice areas in the Gulf States, have made rice growing unprofitable and a new crop for the land is being sought. Basket willows at once suggested themselves as a possibility, and the present investigation is being conducted to determine to what extent they can be successfully grown on lands of this character. The soil is a rich, black muck, and the continuous production of good crops of rice for years with little or no fertilizer indicates its richness.

Wood is extensively used for fuel in the Black Hills region. During the past year the Forest Service at Deadwood, S. D., issued 500 permits authorizing the removal by settlers and homesteaders of 6,000 cords of wood for fuel purposes.

A reconnaissance survey of the plant life of New York State is being carried on by Dr. William L. Bray. Dr. Bray is in charge of the botanical instruction in both the University and the State College of Forestry, and as he has been granted a leave of absence for a year, he will spend this year in resuming a

line of work which he pursued with distinction in the Southwest, namely, in his studies of the vegetation of Texas published in a series of bulletins by the United States Forest Service and the University of Texas.

In the study of the wood-using industries of New York which was carried on by the United States Forest Service and the New York State College of Forestry and which resulted in a comprehensive report, it was seen on every hand that there is great need of a broader reconnaissance survey of the forests of the State. Such a survey of the plant life of the State will furnish a background and a basis upon which the progress of research will stand out in clear proportions. Such surveys of life conditions within a limited area or within a State have come to be regarded as essential in the working out of any policy of conservation of natural resources.

Striking features of the economic crisis which the lumbering interests of this country are now facing are brought to light in the announcement that at the request of prominent lumber interests a two years' course in the business of lumbering is to be given next year by the Harvard Graduate School of Business Administration, in cooperation with the Harvard Forestry School.

It has been discovered that forestry education, after the German pattern, does not meet the needs of the lumbering interests. It is good and necessary, the lumbermen admit, to know how to protect existing tree growth, and to start new growths. But the present and acute problem is how to manufacture the existing trees into lumber and to sell the lumber at a profit. The Federal Government itself is struggling with this problem in its attempts to dispose of lumber from the public reserves.

John M. Gries, of the United States Bureau of Corporations, has been appointed by the Harvard Corporation to give the new course so far as it deals directly with lumbering.

The directors of the Pocono Protective Fire Association recently gave

a dinner to the fire wardens of Monroe County, Pa. It was the first affair of its kind in Pennsylvania, and was given by the directors of the Association to mark the inauguration of a new provision of the law which places fire wardens under the direct supervision of a State forester in counties where the Commissioner of Forestry thinks it advisable to make such appointments. The Association asked for a district forester for Monroe County and John L. Strobeck was selected. The forest fire protective service there has been reorganized and much higher efficiency in the work is expected this season.

Representative Denver S. Church, of California, has introduced a bill by which the Secretary of the Interior is empowered, upon recommendation of the National Forest Reservation Commission, to exchange United States lands now a part of the Sierra National Forest for privately owned timber lands lying within the boundaries of Sierra National Forest and the Yosemite National Park, lands thus acquired by the United States within the boundaries of the Sierra Forest and of the Yosemite National Park to become a part of each park respectively.

Secretary George H. Rhodes, of the California Forest Protective Association, contributed to the California Arbor Day Manual for 1914 outlines for compositions, speeches, declamations, essays and orations for the public school children, which will be a great help in teaching them what all children should know about the forests and inspiring not only a love of trees but a realization of the needs of proper care of the forests. The Association followed this up at the suggestion of the State Superintendent of Public Instruction with a letter to school teachers in the timbered districts calling their attention to the outline in the Manual and offering to help them in every way.

Congressman French, of Idaho, has introduced a bill in the House providing for the appropriation of not more than \$15,000 of the receipts from the national forests in any State, for the

forest schools of the same State. Many of the forest schools could increase considerably their facilities for educating forest students if they received each year the additional aid which such an appropriation would give, and the heads of a number of these schools have already expressed the hope that the bill will pass.

According to the third annual report of F. A. Elliott, State Forester of Oregon, the fire patrol law has proved a powerful help in advancing systematic forest fire protection. He said it was the chief factor in more than doubling the membership of the patrol associations organized in 1911 and 1912, and besides six new associations were formed last spring.

During the year 1913 there were 383 forest fires on privately owned land and 387 in the national forests in this State, but so effective were the organized forest fire fighting associations that comparatively small damage was done. More damage was caused by fires originating in slashings than from fires of all other classes, according to the report.

The sandy tip of Cape Cod, which is constantly shifting under the influence of wind and tide, is to be anchored by reforestation, according to an arrangement announced by the State Harbor and Land Commission and the State Forestry Department of Massachusetts. The lands are known as the Province lands.

Thousands of trees of a type that will not only give stability to the soil but defy the ravages of the gypsy and other moths will be planted this spring.

Timberland owners of Harlan County, Kentucky, have organized the Harlan County Forest Protective Association and the members so far enrolled represent about 200,000 acres. The members are being assessed one-quarter of a cent an acre with provision for additional assessments up to but not exceeding one cent an acre if needed. State Forester Barton will cooperate with the Association and will divide equally all fire fighting expenses. The forest fires have been a serious loss and yearly menace to the forests of Harlan County, and the Association was badly needed.

STATE NEWS

Georgia

Head Forester Graves spent the 14th of April at Athens as the guest of the University of Georgia. He addressed the students at the Chapel in the morning. In the evening he attended a banquet given by the Forest Club, and talked in an informal way.

Mr. Graves went to Atlanta from Athens, to attend the convention of the Tri-State Water and Light Association on the 16th and 17th.

Representatives of the Morse Land and Lumber Company, the Byrd-Mathews Company, and the Pfister & Vogel Company met at Helen the latter part of March and conferred as to the prevention of forest fires on their holdings.

Maine

That enormous damage has been wrought to the spruce, fir, larch, hemlock and white

pine trees of Maine forests during the past year is stated in the annual report of Albert K. Gardner, State horticulturist, filed with the Governor. Mr. Gardner says:

"The increase in numbers of the spruce bud worm during the past three years has given just cause for alarm among owners of spruce, fir, larch, hemlock and white pine. We are constantly receiving letters from wild land owners, and owners of summer camps who are dependent upon the beauty of their trees for a large part of their summer business, telling of the enormous damage being done to the trees by this most serious pest. Many islands along the coast seem to offer particular inducements to the insect, and here we find them especially abundant. During the latter part of the past season, parasites in the form of spiders have accomplished a great deal in controlling them, and it is to be hoped that in another year we will find that they have been more or less exterminated."

South Dakota

The season of 1914 in South Dakota opens with a promise of a considerable activity on the State Forests. The fire season normally opens during the middle of April and continues through October. The fire plan inaugurated in 1913 will be continued with some improvement during the present season. The operation of this plan in conjunction with the plan of the adjoining Harney National Forest and in cooperation with Federal assistance under the Weeks' Law should furnish effectual protection to the State's forest lands.

Owing to the burning of the plant of the Lanphere-Hinrichs Lumber Company at Rapid City in January, logging operations on the forest were at a standstill for some time, excepting for the operations of three or four small portable mills. However, it is expected that the new mill of the company will be in operation again by June 1, when cutting will be resumed on the State tract on Rapid Creek.

The Game-Fence, enclosing 61,000 acres of the Custer Forest as a game preserve, will be completed this season and ready for the game to be purchased by the Game Commission. The erection of this fence was "wished on" the Department of School and Public Lands by the last Legislature, and its construction has been in charge of the State Forest Service. Already a carload of elk from the Jackson's Hole country has been received at the preserve, and are confined in a special corral of one mile square constructed in February on Squaw Creek. A loss of three occurred in shipping, but the balance of the herd seem to be in good condition and perfectly at home on the forest.

Owing to late rains last fall and some early spring moisture, grazing conditions appear to be normal for the spring months.

Michigan

In order to encourage private owners in the reforestation of their waste lands, the Public Domain Commission has in the past offered planting stock from its forest nursery at Higgins Lake to the people of the State at very low figures. The same policy will be pursued this year. Among the species listed for sale are both seedlings and transplants of white pine, Western yellow pine, Scotch pine, Lodgepole pine, white spruce, blue spruce, Norway spruce, red spruce, and Douglas fir. The prices range from \$2.00 per thousand for seedlings two years old to \$8.00 per thousand for transplants of large size, which include packing, crating, and delivery to the railroad station. Plants are not sold in lots of less than 500. Many orders for spring delivery have already been received, and the indications are that the demand for planting stock this season will show a marked increase over that of former years.

The area of State lands reforested each year is gradually increasing. More than half

a million trees will be planted on the Higgins, Houghton, and Fife Lake Forests this spring. White and Norway pine are used almost altogether in this work, although experiments are being conducted on a small scale with such species as Austrian and Scotch pine, European larch, and Norway spruce.

California

California observed Fire Prevention Day on April 18 with gratifying success. State Forester Homans, for the State Board of Forestry, had 135,000 pamphlets distributed to the school children of the State. These told of the damage done by forest fires, gave instruction on how to prevent and how to fight them, and carried also valuable suggestions to teachers for continuing this course of instruction during the year. This sort of educational work is having a decidedly good effect.

Minnesota

State Forester Wm. T. Cox's third annual report as State Forester of Minnesota is just out, and, as might be expected, goes into most interesting detail as to the work of his department during the year. He says that fire prevention was the chief task of the service during 1913 and that considerable attention was also given to obtaining more accurate information regarding the forest resources and of educating the public to a proper appreciation of the forest problem. Mr. Cox says he believes that as soon as the majority of the people of Minnesota realize the condition of the forests, the importance of the industries which they sustain, and the business necessity of properly caring for the woods that the tremendous handicap under which the forest service is laboring will be removed and sufficient funds provided to carry on the work. With this in view much effort was given in 1913 towards reaching the public both through meetings and through the press.

New Hampshire

The Connecticut Valley Lumber Company, under the joint management of Stone & Webster and Hornblower & Weeks, with extensive timberland holdings in northern New Hampshire and Vermont, has closed a contract with the Berlin Mills Company, of Portland, Me., and Berlin, N. H., covering the sale of all softwood timber situated on the Androscoggin slope. It is estimated that about 500,000,000 feet of timber is affected.

This is a tract of about 45,000 acres of virgin territory never before operated, the Connecticut Valley Lumber Company having confined its operations to the Connecticut slope, where it owns approximately 260,000 acres with a softwood stumpage of about 1,500,000,000 feet.



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FORESTRY

FORESTRY ON THE COUNTRY ESTATE

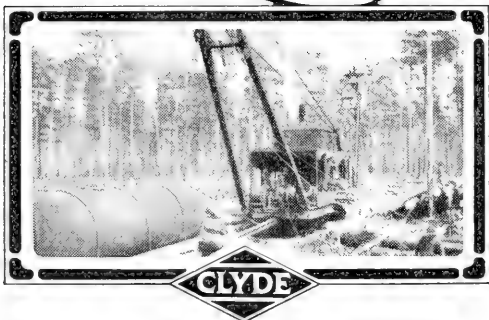
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American Forestry

The Magazine of the American Forestry Association

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June	CONTENTS	1914
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AN EPITOME OF NATIONAL RECLAMATION—By C. J. Blanchard.....	393
With six illustrations.	
STREET TREE PLANTING IN A WESTERN TOWN—By W. W. Robbins.....	403
With one illustration.	
OUR MOUNTAIN MEADOWS—By Harold C. Bradley.....	406
With six illustrations.	
WILD LIFE IN MINNESOTA—By Prof. Charles Johnson.....	414
CHILDREN WAGE WAR.....	415
With one illustration.	
CHESTNUT BLIGHT CONTINUES—By Oliver D. Shock.....	416
With one illustration.	
CONSERVATION FOR LUMBERMEN.....	418
GEORGE W. VANDERBILT, PIONEER IN FORESTRY—By Overton Westfeldt Price..	420
With four illustrations.	
PISGAH FOREST PURCHASED.....	425
With three illustrations.	
FORESTRY AT CHAUTAUQUA.....	430
EXHIBIT OF FOREST PRODUCTS.....	431
CORNELL'S FORESTRY BUILDING.....	432
DRIFT FENCES FOR STOCK.....	433
With two illustrations.	
HALF OF EACH TREE LOST.....	438
With three illustrations.	
RUSSIA'S FOREST FAMINE.....	443
WHITE PINES MENACED.....	444
With one illustration.	
BOY SCOUTS TRAIL BUILDING.....	446
FORESTRY ON THE COUNTRY ESTATE—By Warren H. Miller.....	448
With ten illustrations.	
EDITORIAL.....	457
FOREST NOTES.....	460
CURRENT LITERATURE.....	464

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Declaration of Principles and Policy of the American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies:

FEDERAL ADMINISTRATION AND MANAGEMENT of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

STATE ACTIVITY by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.

FOREST FIRE PROTECTION by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

FOREST PLANTING by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

FOREST TAXATION REFORMS removing unjust burdens from owners of growing timber.

CLOSER UTILIZATION in logging and manufacturing without loss to owner; aid to lumbermen in achieving this.

CUTTING OF MATURE TIMBER where and as the domestic market demands it, except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.

EQUAL PROTECTION to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

CLASSIFICATION by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

American Forestry

VOL XX

JUNE, 1914

No. 6

AN EPITOME OF NATIONAL RECLAMATION

By C. J. BLANCHARD, *Statistician, U. S. R. S.*

NINETEEN hundred and fourteen promises to be an exceptional year in the history of national reclamation. Secretary Lane has allotted every dollar of the Reclamation fund, amounting to \$23,000,000, for the vigorous prosecution of the work. The field is so broad, however, that even with this generous outlay many urgent demands for the taking up of important work must be held in abeyance until additional funds are available. A new and encouraging factor has developed in connection with this work which has heretofore been carried on solely under Federal auspices. Several States, notably Oregon and Washington, have evinced a laudable desire to cooperate in promoting the joint construction of irrigation projects. Oregon has appropriated a large sum of money, and the Secretary of the Interior in turn has set aside an equal amount for the investigation of possible projects on the Deschutes River and in central Oregon.

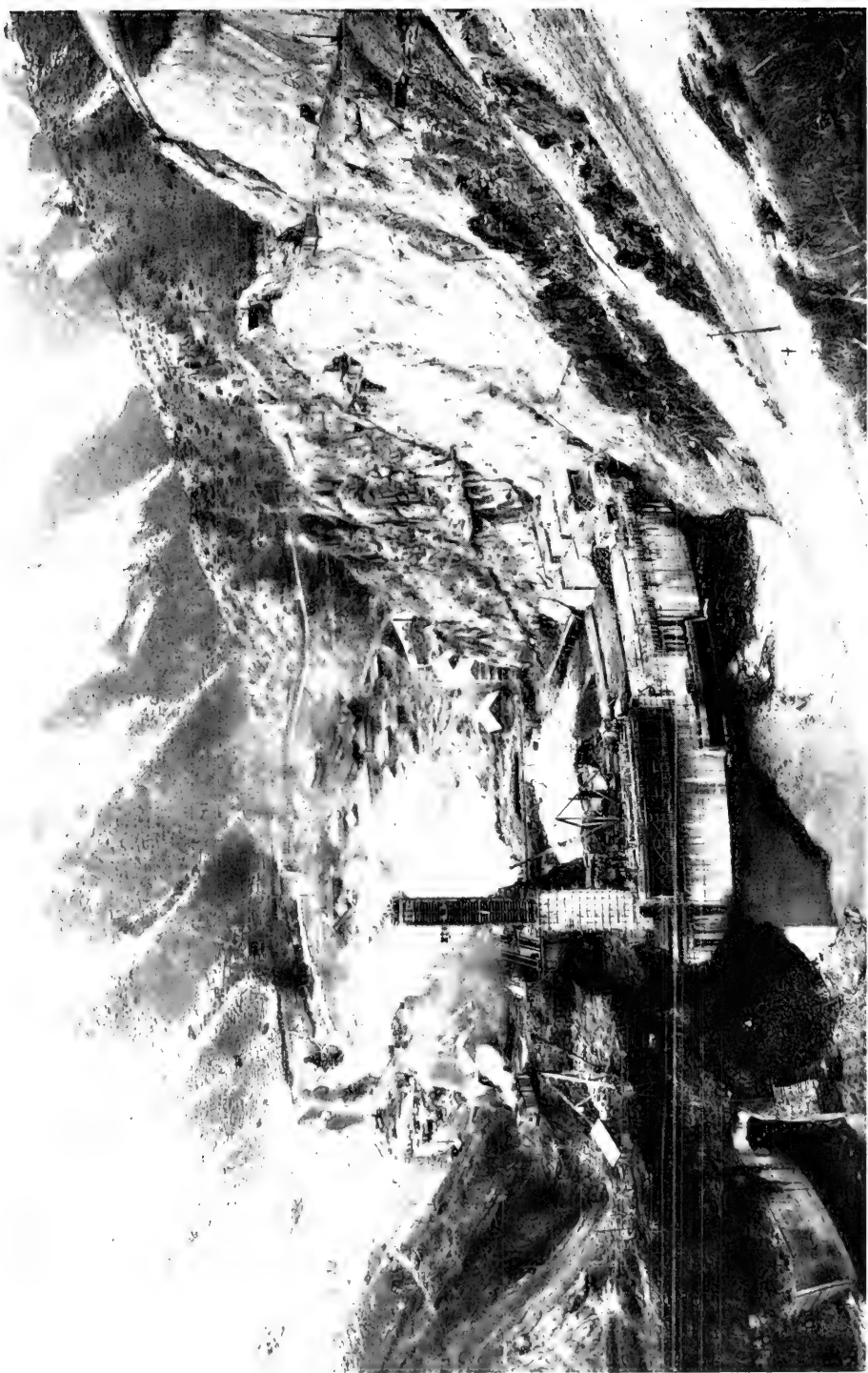
A few years ago a number of projects were undertaken by private parties who encountered vicissitudes and difficulties and finally gave up the task. Meanwhile, settlers have gone upon the land, built their homes and prepared their lands for irrigation. Their condition is serious and the States, recognizing their duty to protect the interest of these citizens, are formulating plans whereby the Service may join in completing the works. Investigations have been ordered by

the Secretary and engineers are making plans to be presented to the Department at an early date.

In Washington a small appropriation has been made for a joint investigation of a large project in that State. Citizens of California have subscribed ten thousand dollars for a similar investigation in cooperation with the Government. This cooperative movement between the States and the Nation is eminently proper and has been strongly encouraged by Secretary Lane.

The failure of a number of large projects undertaken by private companies and under State supervision has given a setback to present development by private capital. From an engineering standpoint many of these projects are entirely feasible, the water supply is ample and the lands are of excellent quality. In several instances the rock upon which they were shattered has been the excessive overhead and interest charges. Such projects offer attractive opportunities for cooperative construction by State and National forces.

The Reclamation Service is now composed of a body of trained and efficient men, its machinery is highly organized, and it is prepared to do effective work at a minimum of cost. Eliminating exorbitant promotion charges, all questions of profits and the excessive expense of securing settlers, many of these projects become at once practicable and feasible and worthy of prompt completion. In each State as



THE ARROWROCK DAM.

THIS DAM IS ON THE BOISE PROJECT IN IDAHO AND WILL BE THE HIGHEST IN THE WORLD, 350 FEET. THE FOUNDATION IS FIFTY FEET BELOW THE STREAM BED AND THE TOP OF THE DAM WILL REACH TO THE SPILLWAY CUT SEEN ON THE RIGHT SIDE OF THE PICTURE.



ELEPHANT BUTTE DAM.

THIS DAM ON THE RIO GRANDE PROJECT IN NEW MEXICO WILL CREATE THE LARGEST IRRIGATION RESERVOIR IN THE WORLD. THE DAM WILL BE 300 FEET HIGH WHILE THE RESERVOIR WILL HOLD SUFFICIENT WATER TO COVER THE STATE OF CONNECTICUT TO A DEPTH OF TEN INCHES.

well as in the Service the machinery is available for the immediate placing of home-seekers upon the irrigable lands. The guarantee of a project by both State and Nation will inspire confidence, and will promote settlement by a high class of home-makers. The joint participation in the cost of the works doubles the field for the Government engineers. Whereas heretofore the attitude of the Western States has been that of "Let Uncle Sam do it," today there is a growing appreciation of the duty of the State to join forces with the Government.

The get-together spirit so strongly advocated by Secretary Lane is bearing fruit, and we may confidently look forward to a long period of joint activity in developing the latent resources of the arid West. On many of the projects yet to be taken up State lines must be eliminated and questions of State's rights must be disregarded in working out broad plans to utilize drainage basins located in several States. The field is vast and full of enormous promise to the whole nation.

Plans are being discussed today which a short time ago would have been regarded as chimerical and visionary. For example, engineers are engaged in a systematic study of available data relating to the entire drainage area of the Colorado River, our American Nile, which embraces 220,000 square miles in seven States. These plans include irrigation, power and navigation and the project is both interstate and international in character. To fructify and make available for hundreds of thousands of families a valley which in its reclaimed state would be like that of the Egyptian Nile in fruitfulness and productivity is a task well worthy of the most progressive nation on earth.

For the present year the activities of the Reclamation Service are to be centered largely upon the twenty-five great projects whereon construction has been proceeding for a number of years. It would be impossible in the space of one short article to make more than brief mention of these. A number,

however, are of such magnitude and importance as to deserve special consideration.

Ranking first in probable total cost and irrigable acreage is the great Boise project of Idaho. Approximately \$14,000,000 will be required to complete the work which will serve 243,000 acres of fertile land in the vicinity of Boise, Nampa and Caldwell. The engineering features of the project are exceedingly comprehensive, embracing two large storage reservoirs, three enormous storage dams, a diversion dam, power plant and transmission lines, standard-gauge railway 19 miles long, telephone lines 210 miles in length, canals 952 miles, drains 50 miles, 871 bridges, 80 buildings, 284 culverts, and 9,599 canal structures.

The most important single feature of the project is the Arrowrock dam which when completed in 1916 will be the highest in the world. This imposing structure blocks a narrow canyon of the Boise River. It is of rubble concrete, with a maximum height of 350 feet, length of crest 1,075 feet, and contents 530,000 cubic yards. Its estimated cost is \$5,000,000. It will store 230,000 acre feet of water and will cover 2,780 acres about 250 feet deep. Additional storage of flood waters has been provided by the construction of two enormous earth fill dams, one of which is 70 feet high and 4,000 feet long, the other 40 feet high and 7,000 feet long, creating a lake with a capacity of 177,600 acre feet. At the Boise diversion dam the Government power plant develops 2,000 horse power, a portion of which is now utilized to actuate all machinery at the Arrowrock camp, the balance being sold to a Boise corporation.

The camp at Arrowrock, the principal terminus of the Government railway, is a community of about 2,000 souls and is entirely under the jurisdiction of the Service. It represents the most careful planning of engineers in its general layout, in the conveniences and appliances furnished for the laborers and their families. The Government runs a large mercantile store, a



THE HUNTLEY PROJECT IN MONTANA.

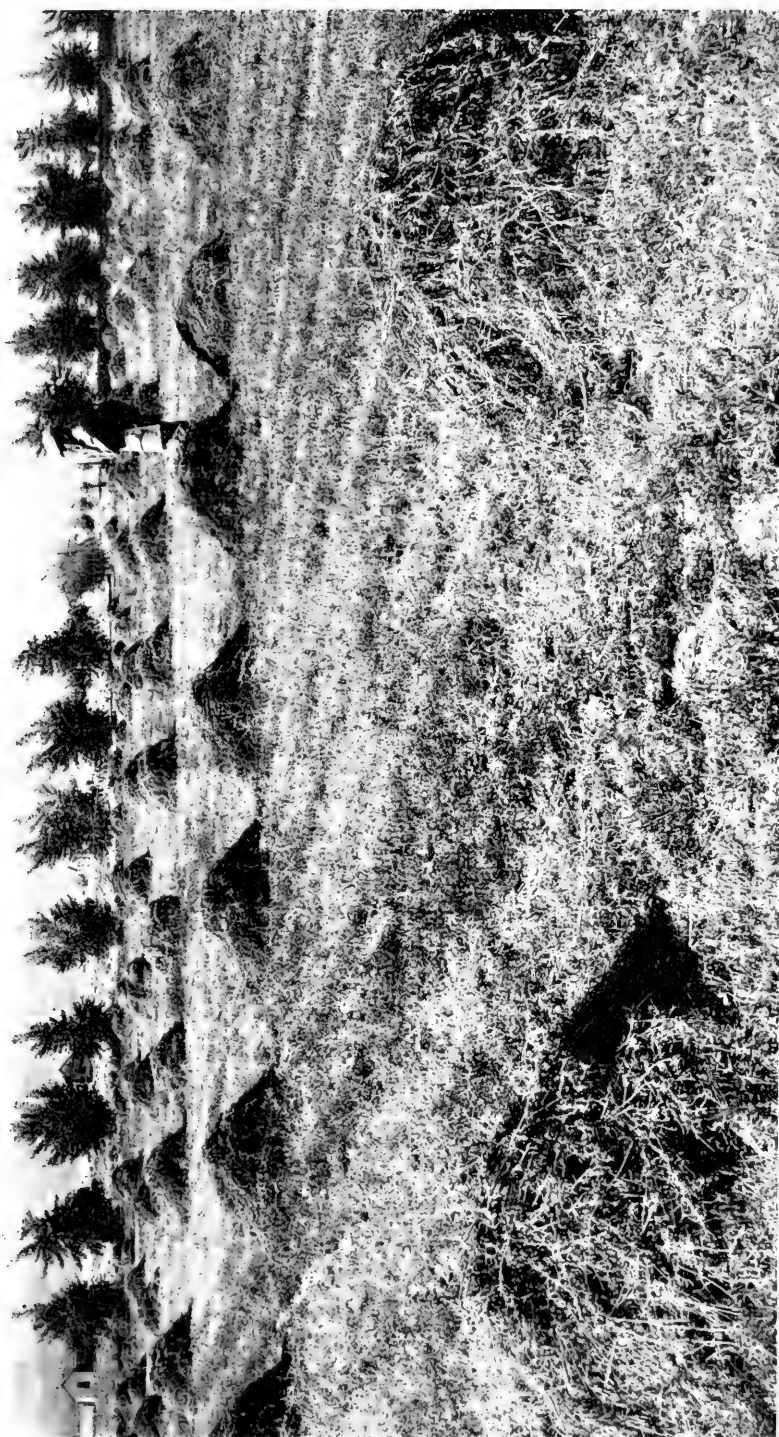
HERE IS A WHEAT FIELD IN SHOCK WITH THE WHEAT READY FOR THRESHING. COULD YOU GUESS THAT JUST SIX YEARS AGO THIS LAND WAS A RAW DESERT BEARING PRACTICALLY NO VEGETATION?



A RIVER WILL RUN HERE.

THIS EXCAVATOR IS MAKING A RIVER BED, THAT'S ALL.

IN THIS BED ST. MARY'S RIVER WILL RUN FROM ITS NATURAL BED INTO MILK RUN VALLEY IN MONTANA. IT IS THE MILK RUN PROJECT.



THE TRUCKEE PROJECT

THIS IS A PICTURE TAKEN NEAR CARSON, NEVADA. THREE YEARS AGO THIS WAS A DESERT, WHILE ON ADJOINING LAND THERE WILL BE OPENED TO SETTLERS NEXT FALL ABOUT ONE THOUSAND FARMS SIMILAR TO THIS.

big mess house feeding 600 at a meal, refrigerator and ice-making plant, hospital, dormitories, cottages, fire department, electric lighting plant, Y. M. C. A., and last but not least, a moving-picture theater. The care and provision made for the comfort and health of its men have resulted in solving in a large measure the problem of retaining competent and industrious workers, many of whom under the guidance of tactful superintendents are today depositing their earnings each pay day in the banks of Boise.

Of almost equal importance and magnitude is the Rio Grande project in New Mexico, Texas and Old Mexico. Its purpose is in a way to recreate a valley in which are found the oldest irrigation systems in the United States. Along the bloody trail made by the lustful Conquistadores of Spain, who swept northward from Mexico in search of the fabled cities of Cibola, the Government engineers are today engaged upon a work of conquest, but of a different nature. They are marking the lines of future canals which will reclaim 180,000 acres of desert. It is a region rich in historical incident, but richer in future promise of permanent and enduring prosperity. On this project the structure of absorbing interest is the great Elephant Butte dam and its huge reservoir. This dam is located about 120 miles north of El Paso and blocks the river just below the black mountain of basalt from which it takes its name. It is of rubble concrete gravity type, straight, with maximum height of 300 feet and 1,200 feet long on top. It will contain 500,000 cubic yards and will cost about \$5,000,000. While not as high as the Arrowrock dam, its storage capacity is vastly greater. Behind the Elephant Butte dam is a valley containing about 40,000 acres which will become a lake more than 45 miles long. Its capacity will be 2,627,000 acre feet, making it one of the largest artificial bodies of water in the world. Its capacity will be a third greater than that of the celebrated Assuan dam in Egypt, at present the largest irrigation reservoir ever built. The Elephant Butte reservoir when full will contain

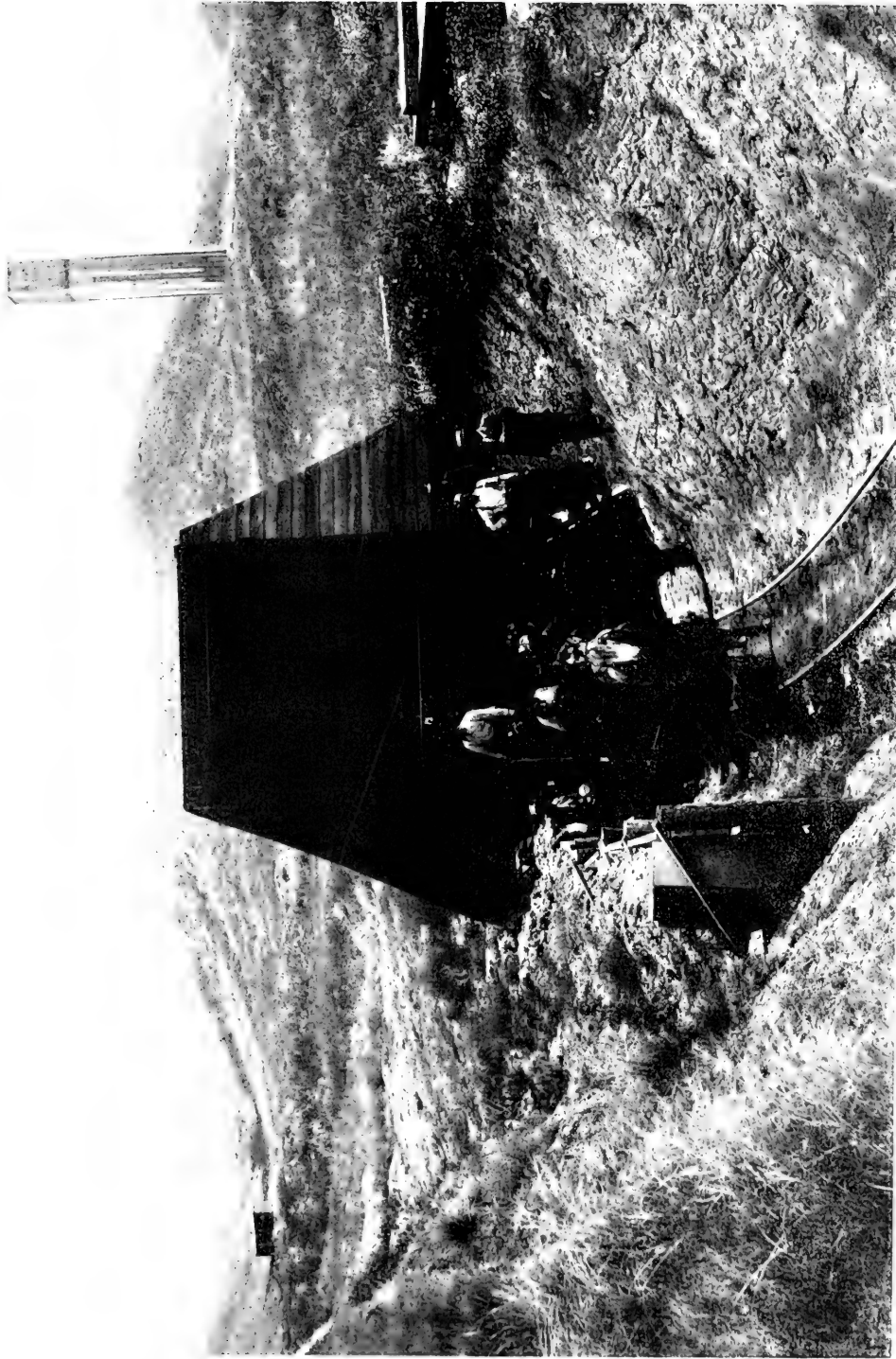
enough water to cover Connecticut ten inches deep. It would fill a stand pipe ten feet in diameter reaching to the moon. It would fill 100 canals stretching from New York to San Francisco, each canal 20 feet wide and 4 feet deep.

A FRIENDLY SWAPPING OF RIVERS.

While Uncle Sam's armed forces are engaged in patrolling our Southern borders momentarily awaiting the command to cross the line to pacify the revolutionary Mexicans, on our Northwestern boundary his engineers are peacefully engaged in the pleasing pastime of swapping rivers. All is amity here and two nations are viewing the performance with every indication of friendly satisfaction.

In northern Montana two streams rise, the St. Mary draining from the lofty peaks of Glacier Park and the Milk River, which has its source on the Great Plains. Both streams flow northward into Canada, the first named finally reaching Hudson Bay. Milk River, after a short course in the United States, flows for nearly 200 miles in Canada and then returns to the United States to empty into the Missouri. Except during flood periods the Milk River is an insignificant stream. It flows through a broad and fertile valley, wanting only a dependable water supply to become one of the garden spots of the Northwest. In its valley in this country the St. Mary River has no irrigable lands, but in Canada it traverses a beautiful valley which could be reclaimed by its waters.

Our engineers conceived the idea of turning this stream by means of a canal cut through a low divide into Cutbank Creek, thence it would flow southward into Marias River and ultimately into the Missouri, irrigating en route a part of the Milk River Valley. While the scheme was feasible, it was expensive. A better plan was found, to wit, turn St. Mary River into Milk River by means of a canal 20 miles long, let the water flow through Canada and divert it later into Milk River Valley in Montana. This plan while much less costly was not practicable unless the United



A GOVERNMENT COAL MINE.

THIS COAL MINE THREE MILES NORTH OF WILLISTON, NORTH DAKOTA, IS OWNED BY THE UNITED STATES RECLAMATION SERVICE. IT HAS ALREADY SUPPLIED 30,000 TONS OF LIGNITE COAL TO THE GOVERNMENT POWER PLANT FROM WHICH ELECTRIC POWER IS UTILIZED TO PUMP WATER ON TEN THOUSAND ACRES OF FERTILE LAND WHILE THE SURPLUS POWER IS SOLD TO THE TOWN OF WILLISTON.

States could be assured that our Canadian brethren would not gobble up all of the flow of both streams. In view of the fact that we could keep the entire flow of the St. Mary River in our own country and that it was the more valuable of the two streams, Canada was obliging enough to enter into a treaty with the United States guaranteeing an equal division of the combined flow of both streams and giving us the right to utilize the channel of Milk River in Canada as a carrying canal for the waters we shall use in Milk River Valley, Montana. Accordingly, active work was begun on St. Mary River to impound its floods, a great canal is being excavated across the divide to wed the waters of these streams and a comprehensive canal system with numerous diversion dams is being constructed in the Milk River Valley between Glasgow and Havre. When completed nearly 200,000 acres of excellent land will be served.

The utilization of electricity developed by the Reclamation Service has become an important adjunct to the irrigation work. On several of the projects a large amount of power has been developed principally for lifting water to lands above the gravity canals. A surplus, however, has been made available for the municipalities and has been an important factor in their progress and growth. On the Minidoka project, Idaho, the power is so cheap that its use is general in the towns for lighting, heating and cooking. Recently a new school house at Rupert was fully equipped with electricity, heating, lighting, power for machinery in manual training, and heat for the cooking stoves in the domestic economy class. It is the only school house in the world so equipped. Groups of farmers are now making plans to utilize this cheap and useful force on their farms and we may soon record the fact that farm houses are lighted and heated with electricity while the housewife utilizes the same force in preparing the family

meals. This seems almost inconceivable to those of us who remember this region in 1904 as a barren waste, remote from transportation and absolutely uninhabited.

On the Williston project, North Dakota, power developed from the Government's own coal mine is sold to the town of Williston. On the Strawberry Valley, Utah, and the Truckee-Carson, Nevada, projects power generated on the canals is leased to several municipalities. On the Salt River project, Arizona, a very large power development has taken place at Roosevelt dam and all the surplus power when available has been leased for a term of years to a large mining corporation at Globe. The valley towns and large manufacturing plants are being furnished a steady supply from additional plants. These power plants will probably afford an opportunity at an early date to witness an interesting experiment in communal operation of valuable public utilities with the farmer as the active agent in charge of the property.

Up to June 30, 1913, the Reclamation Service had constructed about 8,000 miles of canals, several of which carry whole rivers. It had built four of the great dams of the world. Its wagon roads have a mileage of 700, telephones 2,331, transmission lines 351, railroads 51. It has purchased 1,533,544 barrels of cement and manufactured in its own plant 433,887 barrels. The total excavation of rock and earth on that date amounted to 99,245,768 cubic yards. It employed, on an average, 7,616 men during the year. In the past season its canal systems were prepared to irrigate 1,193,374 acres and 641,397 acres were actually watered. The crop returns amounted to nearly \$15,000,000 or an average of \$25 per acre. The total net investment at the close of the fiscal year, June 30, 1913, was \$75,174,283. The total irrigable area under present projects is slightly more than 3,000,000 acres.

Fire Losses Small

Last year the fire loss on the Canadian timber reserves was the smallest ever known, only one-fiftieth of one per cent of the area being burned over.

STREET-TREE PLANTING IN A WESTERN TOWN

By W. W. ROBBINS

A SHADE-TREE survey of a town on the plains of eastern Colorado was recently made. This town of some 8,500 inhabitants has 5,650 street trees. Of these, 35% are Carolina poplars, 26% are lance-leaf cottonwood, and 5% are western broadleaf cottonwood; boxelder, willows, narrowleaf cottonwood and maple-leaved cottonwood constitute another 10%, making a total of 76% undesirable, quick-growing street trees. Elms form 7% and green ash 11% of the street trees. These figures are significant; not that they indicate conditions in one western town only, but are representative of shade-tree planting throughout the plains States generally, and particularly illustrative of the widespread tendency to plant rapid-growing species. I will not say, however, that eastern and middle-western municipalities are free from censure in this regard; but it is true, perhaps, that they are taking more interest in their tree planting.

Shade-tree planting in the west is not hopelessly bad; too harsh criticism of it cannot rightly be made. It must be remembered that the west is young; towns have sprung up like mushrooms. So many questions relative to the larger improvement of the country solicit the attention of western people, that it is not to be wondered at that they have not given serious attention to shade-tree planting. However, western municipalities will, without doubt, soon come to a thoughtful consideration of their trees. In fact, Denver and Colorado Springs have taken the lead in this movement and already have accomplished much.

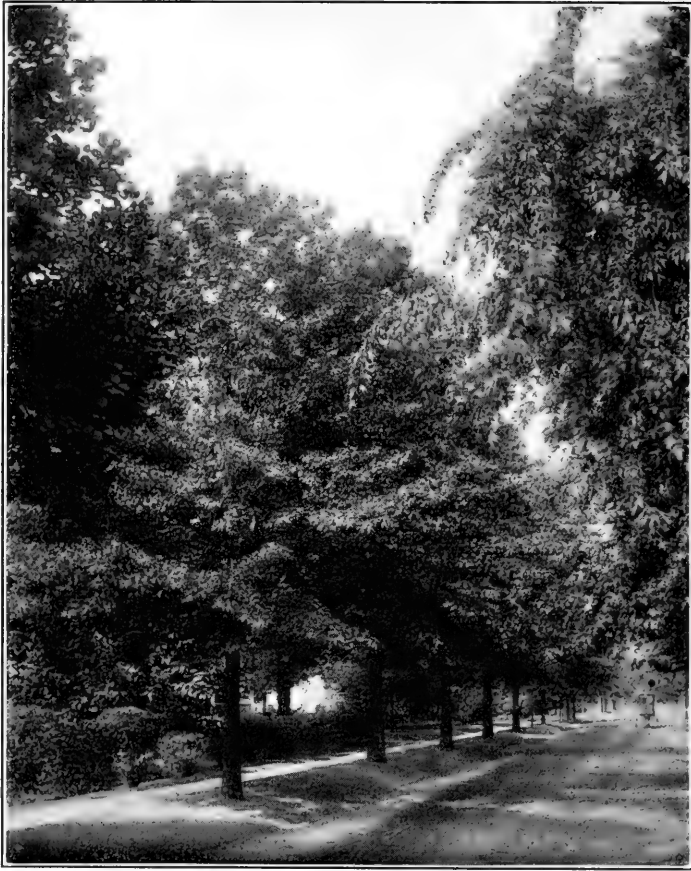
An easterner in conversation with a western girl remarked upon the prosperity and rapid material progress of the west, but added that "the west had not yet gotten the culture of the east."

"No," was the reply, "but when we get it we will make it hum." Whether or not this illustrates the way western people do things, it is well to remember that desirable, slow-growing trees will not "hum." After the proper system of shade-tree planting is put into operation it is a long time before benefits are apparent.

Shade-tree planting in the west is still in the experimental stage; it is attended with no little difficulty. From the trees' standpoint, the variety of successful species is large; but the variety of successful and at the same time desirable trees for street planting is small. As has been indicated, the most conspicuous shade tree in all parts of the west is the cottonwood and its near relative, the Carolina poplar.

I consider that in this western country it is entirely justifiable to alternate quick-growing trees with long-lived ones, much more freely than is usually practiced in the eastern States. There is an urgent need for protection from the hot sun and high winds. One who is familiar with climatic conditions in the west, and with the manner in which it has and is being settled up, can look upon a street planted with cottonwoods with a less critical attitude.

The most general practice is to plant rapid-growers only. And again, if there is an alternation of these with longer-lived species, the former are allowed to crowd out and interfere with the normal growth of the more desirable species. It is remarkable with what tenacity an old cottonwood will be held on to! Overcrowding is practiced with a vengeance. This results from a demand for quick shade. It is not uncommon to see a double row of thirty-year-old cottonwoods along the walk, placed not more than twelve feet apart. Just as much shade could be obtained with fewer trees. Proper spacing al-



A STREET LINED WITH FINE OAKS.

lows the tree to assume its natural spread and maintain its individuality. By crowding, the individual tree becomes unsymmetrical, and if one were to isolate such a tree from its neighbors, it would present a most unsightly appearance. It is unnecessary to sacrifice beauty for shade; it is possible to have both beauty and shade. But it will be necessary to sacrifice temporary effects and speed, if we are to have beautiful streets.

There is a large list of ornamental trees suitable for lawns and parks in the west, but there are very few suitable for the street. For example, evergreens, weeping birches, and Bechtel's flowering crab are well adapted to the lawn but are ridiculously out of place on the street parking. I bear in mind a row of Colorado Blue Spruce planted

as a street tree. Trees for street planting may be divided into two groups: those to be used for permanent effects—long-lived, slow-growing species; and those which produce quick, temporary shade and are usually short-lived. The latter are valuable for use in alternating with those of the first group.

For western planting, in the first group may be placed American elm, cork elm, American linden, Norway maple, hard or sugar maple, green ash, and hackberry. American elm is the most satisfactory. Here it will reach a diameter, breast high, of about eight inches in fifteen years. It is adapted to wide streets and should be planted not less than forty feet apart. American linden is rarely found on western streets, but it is a tree that can be recommended for this region. It is a

comparatively rapid grower, symmetrical, hardy and long-lived. Norway maple, as linden, is a rare tree on streets, although it has found a place on lawns and in parks. It is a beautiful tree, shapely, free from injury of high winds and heavy snows, so common in the west, and is a tree to be strongly recommended for western planting. Green ash is a tree for narrow streets. It is more hardy than the white ash; it has a bright, green foliage, is remarkably free from insects and requires very little pruning. Hackberry is another satisfactory tree for street planting, but needs considerable attention to prevent a scraggly growth.

In the second group of less desirable trees for western streets may be included silver maple, box elder, honey locust, black locust, Carolina poplar, willows and cottonwoods. Silver maple suffers from sunscald; its branches are slender and weak, being easily broken by wind or snow. It cannot be said to do well under western conditions; everywhere one sees the pale colored

foliage of sickly silver maples. Box-elder is most illy-shaped; no tree exhibits such a strong tendency to develop weak crotches; its free use on streets is not advisable. The locusts have been quite extensively planted, but for permanent street effects, cannot be highly recommended. Of the willows and cottonwoods there are many species which do well; the western broadleafed cottonwood and the lanceleaf cottonwood are most commonly planted. These two trees are native throughout the plains region of Colorado; the former is the most common shade tree. The "cottonless" form of the lanceleaf cottonwood is a very desirable tree, superior or at least equal to the Carolina poplar. Carolina poplar, however, is a most valuable tree to the west. It produces abundant shade in from 6 to 8 years. Because of its erect habit, it will stand crowding better than any other cottonwood, and is an ideal tree for alternating with long-lived species. The "cottonless" form is distributed by most western nurseries.

Douglas Fir for Planting Successful

A two-year-old plantation of Douglas fir on the Oregon national forest shows 94 per cent of the trees living. Extensive plantings of young trees in Washington and Oregon are costing only \$8 an acre. Direct seeding of lodgepole pine has been successful without exception on the Arapaho national forest, Colorado. Several of the areas sown two and three years ago show from 5,000 to 10,000 seedlings per acre.



OUR MOUNTAIN MEADOWS

By HAROLD C. BRADLEY

CONSERVATION of our forests has become so much a part of the ideals of the average thinking citizen of the United States today that arguments in favor of the idea need hardly be advanced. Almost every State that still retains wooded areas of significant size is pledged to preserve and conserve those areas to the best of its abilities. Almost every State where forests can grow and where land is available for the purpose is striving to develop forests where today none stand. The withdrawal of forest land by the Government for protection and management is an enterprise which commends itself to every intelligent man. The project as a whole has come to stay; it needs no comment. There are details in the practical working out of the project which need consideration and discussion. It is with one such minor detail that this article has to do—the conservation of our mountain meadows.

In the mountains with which the author is most familiar—the Sierra Nevada range of California and some portions of the Rocky Mountains—the forest-girt meadows with their grass and flowers and tinkling brooklets are a conspicuous part of the landscape. They vary in size from little pockets of grass just big enough to stake a horse on for the night to great verdant valley floors like the Tuolumne Meadows of the Yosemite National Park. They are always lovely, for even in the lower levels of the mountains they retain their verdure when all else is parched and brown with drought, and in the season of their prime are fragrant and bright as any garden. To the wanderer with his horse they are more than lovely—they are a necessity. Not only that, but, as will be shown later, they are one of the essentials in prolonging and equalizing streamflow. Wherever the conservation of water on our National

Forests is of importance, and wherever the maintenance of good camping facilities is also of importance, as in the Yosemite National Park, these mountain meadows must be preserved. In the latter case they are of such great value to the public that their preservation would seem to be the first thought of the administration. And yet it is perfectly evident to anyone who has traveled the trails of the Yosemite region that these little meadows are fast vanishing. Exclusive of the three or four great valley meadows, I should estimate the loss of meadow area in the last ten or fifteen years as fully twenty-five per cent. And thus far, no step has been taken to check the loss.

In what follows I shall speak especially of the meadows of the Yosemite Park, though the same condition prevails north and south throughout the National Forests of the Sierras, and to a less degree in the high plateau regions of the Bitterroot Forest Reserve of Idaho. I am assured that it is also to be found in the reserves of the Rocky Mountains proper. Indeed, wherever the mountain range has passed through such a history as to have produced these meadows, they must develop, diminish, and eventually disappear if left to themselves. They represent but a passing phase in the cycle, albeit a phase which may be retained indefinitely if properly cared for.

In the first place these meadows have had a variety of origins. The great majority of them are lake beds, glacial pockets scooped out and silted up, or valley bottoms dammed by a moraine. Along a little stream near its sources, a fallen tree may be the cause of holding back the water, retaining its silt and eventually forming a little meadow patch. In this way, one finds along the upper few miles of brooks that spring in the parklike plateaus, countless little garden spots, moist and rich with grass and herbage. In the Yo-



LOWER TUOLUMNE MEADOWS.

THE OUTPOSTS OF THE INVADING FOREST ARE TO BE SEEN ESTABLISHING THEMSELVES IN THE VERY MIDDLE OF THE MEADOW AND IT WILL NOT BE LONG BEFORE ALL OF THIS FLAT LAND WILL BE FORESTED.



A LAKE BED MEADOW.

THIS IS A TYPICAL MEADOW OF THE HIGHER LEVELS. HERE WAS ONCE A SHALLOW LAKE. THE GROUND IS GRASS GROWN AND STREWN WITH FLOWERS.

semite Park there is scarcely a stream which near its source does not wander through a score or more of these little mountain gems—emeralds strung upon a thread of silver. And wherever there is a meadow there is a place to camp, with water and rich pickings for the horses. Late in the season, after months of cloudless skies, after the snow fields have shrunk to their smallest size and the forest stands parched and tinder dry, the little meadows still are green and cool and decked with flowers, and from their lower ends the precious trickle of water still flows away to keep the shrunken brooklets running, and the river farther down.

Left to itself, this lake-bed meadow in time grows dry. The peat bog holds back more silt each year till a spongy soil is formed. For a period the grass and flowers flourish, as the ground grows slowly drier and firmer, but in the end the trees push in and claim the

land, and the meadow exists no more. Even the lodgepole pine demands a certain degree of dryness before it will grow, but as it gains a foothold round the edge of such a meadow its rootlets carry the water up out of the spongy soil and into the air currents. Its leaves aggregate a surface many times that of the meadow under it, and from this increased surface evaporation proceeds rapidly. Little by little, the tree as it grows apace pulls more and more of the water from the meadow reservoir, throws it higher and higher into the air where the scorching breezes blow, and from its tremendous leaf surface the water is quickly lost. About the feet of the first tree a host of seedlings springs and like a skirmish line advance into the meadow. A series of dry years may make a large zone about the edge of such a meadow habitable for the pines and in they crowd wherever a seed can sprout. Once in, they hold



PORTION OF THE TORTUOSE MEADOWS.

THIS SECTION IS IN THE UPPER END OF THE YOSEMITE NATIONAL PARK. THE FOREST IS GRADUALLY CLOSING UP THE LITTLE VALLEY.



RESISTING INVASION.

THIS MEADOW ALTHOUGH SURROUNDED BY TREES HAS SO FAR RESISTED INVASION AND IS STILL GREEN AND COOL AND DECKED WITH FLOWERS.

their own by their increased evaporation. Rarely indeed does one find a meadow so invaded, able to drown out its foes in succeeding wet seasons. Once the process gets under way the fate of the meadow is sealed. The young pines grow and multiply with amazing rapidity, and in the course of a decade or two the meadow is no more. In its place there stands a thicket of spindling lodge poles reaching upward desperately in their fight for light and air, shading out the grass and flowers, robbing the soil of its moisture and converting the open glade into a jungle of slender saplings. Comes a heavy storm of wind and down go the weakly lodgepoles a tangled mass of kindling for the first spark to set ablaze. The peaty soil, dried out, burns too and all that remains of the once lovely meadow is a charred patch of utter desolation that centuries may hardly heal. If the thicket is not destroyed by storm, but continues to

grow, the resulting timber is of little use, and standing crowded together is ever menaced by fire, which in such a growth would burn with greatest fierceness. For our meadow we have worse than nothing in return, and the brooklet which trickled from the meadow runs less and less, and eventually stops entirely.

It may be stated positively that the mountain meadows of the Sierras and elsewhere are as valuable for regulating streamflow as are the forests themselves. On the ridges and valley slopes the trees shade the snow and allows the spring melting to go on slowly. The forest humus also holds back the rapid runoff to the valley bottom. But if that valley bottom is filled with lake-bed meadows another check is placed upon the freshets. The deep spongy soil fills itself to overflowing; it forms a reservoir underground with all the physical advantages of a sponge, tenaciously retaining the water, preventing

the rapid flow from upper to lower levels. And when the spring melting is over and the surplus from the valley slopes has ceased to run, the meadow still retains within itself a mass of water which will slowly seep away to the brooklet and keep running through the summer months of drought. Nor does the meadow lose much to the air. The thick grass prevents rapid air currents close to the ground, and the layer of air saturated with moisture lies like a blanket over the meadow preventing further evaporation. At night much of this moisture is again precipitated as a drenching dew. In contrast to this, the breezes are constantly moving through the trees, and they are always dry. They pick up from the leaves whatever moisture they will release. The more rapid and vigorous the growth of the trees, the more moisture will they carry up for evaporation. It would be difficult to estimate the difference in the amount evaporated from a meadow, and the amount lost from the same area grown up to trees. I believe the excess of the latter is easily a hundred-fold greater than the former. The ideal conditions, then, for equalizing stream flow from mountain regions like the Sierra is to preserve the timber on the slopes and the meadows in the valley bottoms.

Not only are the mountain meadows necessary for the proper conservation of the streams, but in the National Park where the fundamental purpose of the reserve is for play-ground use, the value of the meadow can scarcely be estimated. A man can go where his horse can go, and where his horse can find feed a man must camp. The fact that the Yosemite Park is dotted with thousands of these verdant feed patches is one of the reasons why this park is the most ideal region in this country for the pack—and the saddle-horse type of camping. The climate is practically rainless for the three summer months. The little meadows prevent its becoming a desert. Eliminate the meadows and camping will cease absolutely. Decrease the number and area of the meadows and camping will correspondingly grow less easy and attractive. The

park will thus lose the real reason for its existence as a park.

To anyone who traversed the park a decade or more ago and returns to it today, the change which is taking place is perfectly apparent. Meadows which ten years ago were clear and open to grazing, are today pine jungles devoid of feed for the horses. Others which have not been blotted out completely have been considerably diminished. Excluding a few of the great meadows, like the Tuolumne Meadows, which will long maintain themselves, I should say that the meadow area of our National Park has been reduced twenty-five per cent during the last ten or fifteen years. Within another decade the securing of feed and camping places along some of the trails will become a serious problem, unless steps are taken to check the advance of the forest. For example, a favorite camping place along the Big Oak Flat Road, a few miles from the Valley, was Tammarak Flat. Fifteen years ago the lower end of the flat was a charming meadow through which ran a fine trout stream and about which on higher ground stood a well-grown forest. Today there is scarcely a vestige of the meadow at the lower end, the young trees crowding in so close that a pack horse can scarcely force his way through. There is no grass, where before was fine feed. This is one of many instances of a lovely camp ground of a few years ago absolutely effaced. All over the Park the same forces are at work, nor is it surprising that the change should thus suddenly appear. Presumably the lakes of about the same size left as the glaciers receded, have silted up in approximately the same period of time. The resulting flats have grown to meadows, and now a large percentage of them are ready to undergo the final transformation. Furthermore, the early grazing of this whole region by the sheep, and the fires kindled by their herders at the end of each season burning off the dry grass and brush, destroyed each season's crop of seedlings. From the 'sixties, therefore, to the time when the Park was reserved from grazing, the forest advance was artificially prevented. It has



A CHANGE IS NEAR.

HERE IS A SHALLOW LAKELET WHICH IT IS APPARENT, OWING TO THE NATURE OF THE COUNTRY, WILL SOON DRY UP AND A MOUNTAIN MEADOW WILL BE FORMED.



A STREAM-SIDE MEADOW.

HERE THE INVASION IS WELL ADVANCED AND THE YOUNG GROWTH OF TREES THICK AND HARDY.

only been within the last twenty years or less that sheep grazing on the Park has been effectively stopped. It is significant that the jungles now growing up in the meadows are all less than twenty years old.

There can be no question as to the facts. They are patent to any observer. The remedy is less clear. The fact, however, that the sheep herders prevented the change that is now in progress shows that the problem can be solved. Their method was, however, a wasteful one. Not only were the seedlings in the meadows destroyed by their fires, but the young trees throughout the burned-over areas of the forests, and many a full-grown tree as well. The cost to the forest was far greater than the good to the meadows. There is, however, one way that might prove feasible. Each year several hundred soldiers are stationed about the Park as a patrol. They register and control

the movements of campers, and are expected to prevent cattle and sheep from being herded into the Park, as well as to prevent or extinguish forest fires. Now if this band of soldiers can be set to work with brush scythes and axes, trimming out the meadows, a great deal of good will result. Two or three seasons of such attention will easily restore the meadows to their former state, and a little work each year will keep them in good condition. If we are not willing to have the soldiers work, then a force of forest rangers should be given the task of keeping the meadows open. Whatever it costs in trouble or money, we should see to it that this Park of ours—the best and most wonderful camp ground in this country—is not allowed to lose its public usefulness and charm. The meadows, once gone completely, can never be restored.

WILD LIFE IN MINNESOTA

By PROF. CHARLES JOHNSON, *University of Minnesota*

THE mink population has greatly diminished in many parts of Northern Minnesota, where it was formerly quite common and where conditions are well suited to its habits. That it has been trapped out is the cause.

The otter, the pine marten or sable, and the fisher are so few in Minnesota today that their total disappearance from the State seems but a matter of a few years.

Unless protective measures are adopted, the end result is clear.

The fisher and the marten are primarily deep-forest animals, and therefore are doomed to pass with the forest.

The lynx and wild-cat have become exceedingly scarce. The lynx has nearly vanished from our north woods and the wild-cat is too scarce to have any serious standing as a game destroyer.

The black bear, once plentiful throughout all the northern regions of the State, has suffered relentless persecution, and to this day is generally killed on sight whenever opportunity

offers. Harmless alike to man and beast in our State, the black bear should have a closed season for a period of years, and when reopened, the killing season should be regulated by law.

I believe our deer population at present is between, say, 30,000 and 40,000 at most.

Some of our wild life is near extinction, and the killing of it should be completely stopped for a period of years. Others are surely decreasing, perhaps more rapidly than we are aware, and still others are as yet holding their own.

Our big-game animals and many of our choicest fur-bearers we have seen are essentially forest dwellers, and their fate is inseparably wrapped up with the fate of the forests. Minnesota has abundant natural resources for the permanent preservation of all her wild forms and needs but the awakening of the people to a full realization of their worth, that they may insist upon the enactment of proper measures such as the proposed forestry amendment for State forests would provide for game refuges.

China's Match Wood Imports

The imports of matches into China greatly exceed in value any other wood product. Most of the matches come in from Japan.

Sawdust for Grape Packing

Redwood sawdust is being used by vineyardists in California for packing fresh table grapes. It takes the place of the ground cork used for imported Spanish grapes.

Idaho's Highest Peak

Hyndman Peak, Idaho, the highest named peak in the State, is more than 12,000 feet high. Several unnamed peaks near it are of about the same elevation. All are on the divide between the Sawtooth and the Lemhi national forests.



REMOVING EGG MASSES OF THE TUSSOCK MOTH CATERPILLAR.

CHILDREN WAGE WAR

THE sad ravages of the Tussock moth caterpillar in New England were apparent to all those who lived or passed through that section of country last summer. Whole orchards of fruit trees as well as the trees and shrubs by the wayside were defoliated and left looking as if a fire had passed over them. Especially in the town of Stockbridge, Massachusetts, the havoc wrought by this pest was most complete and destructive.

This so stirred the hearts of the people there, that they determined to attempt some "preventive treatment" for this spring, and so they arranged to enlist the school children in the work. Accordingly, three organizations—the Laurel Hill Association, the Town Club and the Grange—clubbed together and offered prizes to the schools which would bring in the largest number of

"egg masses." They were to be taken to the teachers, who would count and then burn them. Only the grade schools could compete, and the price to be paid was fifty cents per thousand "masses." This money, as well as the prizes, was given to the school as a body and not to the individual children. The first prize was \$10.00, and the second prize was \$5.00. Incidentally, it shows the public spirit of the children that they were so interested, worked so hard, and accomplished so much simply for the good of the town and not for their own pockets. The official report of the result of this enterprise has just been presented, and the first prize was won by the Interlaken Grammar School and the second prize by the Interlaken Primary School. The total cost of the campaign was \$98.00, and 112,119 egg masses were destroyed.

CHESTNUT BLIGHT CONTINUES

By OLIVER D. SCHOCK

THAT the chestnut bark-disease has not abated its virulence in southern and eastern Pennsylvania forest areas this spring because of natural enemies, as some optimists had predicted, has been confirmed by recent investigations. The numerous observations just made have effectually dispelled the idea prevalent in some minds that Nature would soon come to our relief and supply some other parasite to remove or effectually control this fatal enemy of the native chestnut. In some unknown manner, the pest is still able to maintain its ascendancy in power, and those who are regarded as the most competent criterion as to the situation in its true aspect declare that there is as yet no foundation for the fulfillment of the hope that the equilibrium of Nature lost would be restored in the near future; in fact, chestnut owners are in despair, because they are compelled to battle against the disease, so far as Pennsylvania interests are concerned, without receiving any assistance from the State authorities.

Reports from western Pennsylvania counties are more favorable; for wherever the cutting-out process was practiced last season, the bark-disease is found but infrequently, and if the effective work done by the State at that period is now maintained by the owners, they will be able to make a successful stand against the rapid and costly spread of the parasite. At the worst, only spot infections occur in the counties west of the Allegheny Mountains, and it will be a matter of sincere regret if the contest inaugurated by the State should now be permitted to lapse, because the Chestnut Tree Blight Commission refused a proffered appropriation of \$100 because the amount would prove insufficient to perform all of the work that had been mapped out for the coming two years, and because a larger amount had been asked for. In

this connection it might be explained that the Pennsylvania Chestnut Tree Blight Commission has closed its financial accounts with the Commonwealth of Pennsylvania, and refunded to the State Treasurer a snug little balance which had remained unexpended.

Friends of forest conservation are making the prediction that the next legislature will again make an appropriation for the renewal of the fight for the preservation of Pennsylvania's immensely valuable chestnut timber. The amended law on the statutes continues the Governor's authority to appoint the necessary members of a Chestnut Tree Blight Commission indefinitely, or just so long as their services may be regarded as of value to the Commonwealth. This amendment to the original Act of Assembly was passed and approved during the closing days of the session of 1913. Under these conditions, it is only necessary that an appropriation bill should be introduced and passed. There is hardly any doubt, whatever, as to the fact that either of the gubernatorial candidates now contesting for the office being in thorough accord with all reasonable forestry questions or propositions. The Commonwealth, with its own one million acres of forest land, could not be otherwise than in sympathy with the question of forest protection and development.

Nurserymen report that there is a better demand for chestnut nursery stock than last season; that certain varieties are being ordered and planted more freely, and that there are expectations that with proper watchfulness and cultivation, chestnut orchards may again be established with success. Planters venture upon the expectation that the chestnut blight may be exterminated by the discovery of some simple remedial agency, such as was the case when the fruit tree owner learned that lime, sulphur and salt, properly com-



AFFECTED CHESTNUT TREES

THESE TREES ARE BEING SPRAYED WITH BORDEAUX MIXTURE IN THE EFFORT TO SAVE THEM FROM THE BLIGHT.

bined, was all that was needed to keep under control the pernicious San Jose scale, which at one time had threatened to exterminate every apple tree in Pennsylvania. The United States Department of Agriculture, through the efficient help of Dr. Haven Metcalf, Pathologist of the Forestry Bureau, offers much encouragement through its research work upon the blight and a long line of experiments in several laboratories.

The bibliography of the chestnut-tree bark disease shows the wonderful interest that this new enemy of the chestnut has already aroused. Over 300

publications are quoted, and the numerous writers all agree upon the general opinion that the blight is a most difficult disease to control and eradicate. Those engaged in genuine field work formed the same belief at the very outset of their task, although there was a material difference as to the methods of treatment, etc. Pennsylvania's literature relating to the blight will be the most complete and exhaustive that has been prepared by any State up to this period. Its practical field work attracted widespread attention, and there is ample occasion to express the regrets of the thousands of disappointed

friends of forestry who were anxious that the fight should be continued. Fully 200 trained men were engaged in the battle at one time, and every county and nook of the State had been thoroughly scouted when the final orders to discontinue all further outdoor work were issued. His Excellency, Governor

Tener, who is a staunch friend of forestry, has at all times been in hearty accord to save the chestnut of Pennsylvania, while the National State forestry officials also were always strongly cooperating with the Chestnut Tree Blight Commission.

CONSERVATION FOR LUMBERMEN

AT THE recent meeting of the National Lumber Manufacturers Association in Chicago, Capt. J. B. White, of Kansas City, Mo., reporting as chairman of the conservation committee, outlined in vigorous language just what conservation of the forests does mean now and may mean in the future for the lumbermen. He said in part on this subject:

"I believe that conservation is good for about all the ills that lumbermen are heirs to. I believe it will cure all the ills that afflict the lumber body. I believe that if we would conserve, if we could legally conserve our timber resources, that we would be doing something of benefit to ourselves in this generation, and to all succeeding generations, and everyone says, 'That is our duty.' They say it is the duty of us individually to practice conservation, but it is a crime if we get together and agree upon a method of conservation; and that is the position we are in. We are told that we should conserve; we are told that we should make no more lumber than the market requires; we are told that we should market and sell everything in that tree when we cut that tree down, and yet we are not permitted to get together and agree on how this can be done economically. And so I have said that I wish some one would do it for us

"I wish it were possible for the Nation to pass a law, uniform in all the States, that would make it a crime to leave any part of the tree in the woods that would make lumber good enough for a hog pen, a sidewalk, or for sheathing on a house, for boxes or for any-

thing else, and if it were made a criminal offense, and if the very fact of your finding the tops of trees in the woods, scattered throughout the forests, were regarded as prima facie evidence that you had violated the law by committing waste, there should be some way of going to the penitentiary, or else making the price high enough so that you could afford to bring that log in.

"Now, if we can not get together and agree upon a method that is practical and economical and possible, some of our legislators and politicians ought to pass laws that would be so drastic that we could not escape saving our forests without going to the penitentiary. Now, that is not an overdrawn picture; it is an absolute fact. I think that we are committing a crime if we waste our trees and leave nothing for future generations.

TREE-PLANTING LOGIC.

"We have been told that we should plant trees. We have found by observation, by examining the forests of foreign countries, that trees are planted and can be planted here at a profit, but not when we can buy trees already grown for half the amount that it will cost to grow them. Unless we can get for our stumpage something near what it will cost to grow a poor substitute in a second-growth tree, we are not going to practice conservation; and as a wise old solon—he is not old—he may not be here; I do not see him; he was here this morning—I call him a wise old solon, but we used to call him the silver-tongued orator when he attended our conventions some years ago—he said

once before a legislative committee that we never could conserve our forests until we made our forests worth conserving, and that is the truth. No man will plant a tree nor can he afford to plant a tree unless the product that grows is sufficient to pay the cost of planting and taking care of that product until it is ready for the market.

"A number of years ago a committee on conservation was apointed by the president of the National Lumber Manufacturers' Association, and I was made chairman of that committee. The salary of \$100 a month allowed for that year I was authorized to turn over to the secretary of the conservation association, of which Hon. Gifford Pinchot was president, and it was so disposed of. Much good was done in the way of publicity, which helped to give the people a better understanding as to the correct principles of lumbering and forestry. At that time we were censured for cutting down the trees. It was a hysteria that went over the country, and nothing was left in that hysteria except the sentiment of 'Woodman, spare that tree!' It was wholly forgotten that it was necessary to cut commercial trees, to cut lumber for the market, to build cities, towns and

homes for the people, but the lumberman was said to be a wasteful man; he was destroying, cutting down, burning and destroying; yet when we want to get together and agree upon a policy there is no way of getting together and so agreeing. Of course that will some time come, because it is absolutely necessary.

"As this annual meeting is usually only attended by the officers and delegates of the respective affiliated associations of white pine, yellow pine, cypress, redwood, fir, hemlock and hardwood organizations it is difficult to secure a committee on conservation who can get together and prepare a plan of practical cooperation in the practice of forest conservation that would be applicable to the various organizations representing the different woods under varying conditions. Therefore, your committee recommends that the subject of forest conservation be given free expression in discussion by all the delegates, and that at each annual meeting some recognized authority be invited to speak or to prepare a paper to be read in our meeting, and that the American Forestry Association of the United States be asked to recommend such a speaker for our next annual meeting."

[Successful Planting

Results from western white pine plantations, three seasons or more old, show an average of 97 per cent success. On average white pine soil planting can be conducted for from \$5 to \$6 per acre.

Botanists View of Cypress

Forest botanists recognize only one cypress in the United States. Its range extends from Delaware southward around the coast into Texas and up the Mississippi valley to Illinois and Indiana. It is one of the few cone-bearing trees which drop their leaves in winter. The heartwood of cypress is noted for its decay-resistant properties.

Chinese Reforestation

The Chinese national conservation bureau is considering reforestation at the headwaters of the Yellow River. The government reports shows that this will ameliorate the torrents and cause a more regular flow from the now denuded uplands. It is acknowledged, however, that this reforestation may not have an appreciable effect within the lifetime of the present generation.

110 Miles of Fire Lines

In preparation for the coming fire season in California, 110 miles of fire lines have been built on the Sierra national forest.



ON THE AUTOMOBILE ROAD, WHICH MAKES PISGAH FOREST ONE OF THE MOST ACCESSIBLE MOUNTAIN FORESTS IN AMERICA.

GEO. W. VANDERBILT, PIONEER IN FORESTRY

By OVERTON WESTFELDT PRICE

OUR national problem in forestry depends chiefly upon the care given to private forests. The men in the United States who first applied practical forestry to their holdings were in a very real sense public benefactors; for they created those object lessons in the methods and the results of forest conservation which were absolutely essential to its wider application to private forest lands.

First among the pioneers in the practice of forestry on a large scale in America was the late George W. Vanderbilt. It was he, who, nearly twenty-five years ago, purchased a great mountain forest tract on the headwaters of the French Broad River and its tributaries in Western North Carolina, and acting under the advice of Gifford Pinchot, then a consulting forester, at once put his forest holdings under conservative management. In those early days

it called for a man of much vision and of strong convictions to adopt the practice of forestry. Those were still the days in which forestry was looked upon with indifference by most Americans, and as a chimerical and fantastic theory by not a few. The practical possibilities of forest conservation as a sound business investment for the forest owner had gained little hold on the public mind and it is exceedingly probable that Mr. Vanderbilt acted in the face of the remonstrance of his business advisors, when he set out to demonstrate that forestry can be applied successfully to private lands, with benefit both to the community and to the man who owns them in fee simple.

Two definite and resolute motives actuated Mr. Vanderbilt in adopting forestry and in continuing to practice it unflinchingly on his forest holdings of considerably over one hundred thou-



THE LATE GEORGE W. VANDERBILT, PIONEER IN PRIVATE FORESTRY AND A VICE-PRESIDENT OF THE AMERICAN FORESTRY ASSOCIATION.

sand acres, up to the time of his death. The one was the belief, which has been fully justified by the results which he attained, that Western North Carolina with its rich hardwood forests, and its remarkable possibilities for industrial growth, offered an exceptionally favorable opportunity for good returns from timber growing. The other was the conviction that the ownership of forest

lands entails certain definite responsibilities to the public; for Mr. Vanderbilt was one of those who held that the private ownership of any resource necessary to the general welfare carries with it the moral obligation of faithful stewardship to the public.

I recall an occasion a few years ago on which I heard Mr. Vanderbilt, usually a man of much reserve, speak

out from the heart his admirable conception of his duty as the owner of Pisgah Forest. The question of the terms on which a pending timber sale should be made, was before him for decision. He faced the alternative of requiring that cutting under this sale should follow the methods of practical forestry, or of waiving all restrictions looking to the protection of the forest. He was reminded that the latter method would naturally be more attractive to prospective purchasers, and that its adoption would probably result in a much higher price being paid for the timber.

"I have stuck to forestry from the beginning," said Mr. Vanderbilt warmly, "and I shall not forsake it now. For me to impair the future usefulness of Pisgah Forest in order to somewhat increase present revenues, would be bad business policy. But apart from that, it would be bad citizenship. As I see it, no man is a good citizen who destroys for selfish ends a growing forest."

Such was the sincerity and the deep sense of obligation to his fellow men which characterized Mr. Vanderbilt's policy of forest conservation. Pisgah Forest, its mountain slopes clothed in an unbroken mantle of protective tree growth, is his monument. He transformed it by nearly a quarter of a century's efficient fire protection, from a forest characterized by scanty young growth, thin humus covering, and impoverished soil, as the result of injury it had suffered in former years from excessive grazing and recurrent fires, to one whose silvicultural condition is probably unequaled elsewhere in the Southern Appalachians. The forest mould has again accumulated, and a young growth of remarkable density has sprung up under the old trees; and in the rich poplar coves of Pisgah Forest and on its slopes and ridges as well, has taken place with the unbroken years of fire protection, a remarkable restoration to primeval forest conditions.

If a man wants to profit by probably the most forcible object lesson in the results of forest conservation which America contains, he needs only to visit

one of the many forest tracts of the Southern Mountains on which nature is struggling against the triple combination of fire, unregulated grazing and destructive lumbering, and then to feast his eyes on the dense and thrifty growth of Pisgah Forest, with its thickets of hardwood saplings, its deep humus layer, and its rare freedom from disease.

But Mr. Vanderbilt did not only preserve the productive capacity of Pisgah Forest. He made it, under a broad and careful plan of development, one of the most easily accessible mountain forests in the United States. In the old days, an excursion into its recesses entailed for its accomplishment an unfailing reserve of enthusiasm, and the vigorous cooperation of a sure-footed mule. For when Mr. Vanderbilt acquired it, Pisgah Forest was a wilderness, and the only means of penetrating it was over a few dim trails occasionally used by the mountaineers, who dug, "sang," grazed cattle, hunted, fished, and possibly "stilled" now and then within its boundaries. Today good roads run up each of the larger valleys, and a network of well graded trails leads from them to all parts of the property. The aggregate length of the roads and trails probably exceeds 200 miles.

The crowning achievement of Mr. Vanderbilt's vigorous policy for giving Pisgah Forest so complete a system of transportation as to make it practically a park, was the construction of sixteen miles of automobile road, which make it possible to reach the heart of the tract in a couple of hours from Asheville, and to enjoy a superb panorama of mountain scenery on the way. At its highest point this road reaches an altitude of five thousand two hundred feet.

Biltmore Forest, the second large division of Mr. Vanderbilt's forest holdings, lies on both sides of the French Broad River near Asheville. As the result of its accessibility, it suffered far more severely from destructive logging than did Pisgah Forest at the hands of its former owners, most of them small farmers, who found a ready market in Asheville for firewood, and for saw logs at local mills. Cutting had been



FROM PISCANI RIDGE OVERLOOKING THE LOWER SLOPES OF PISCANI FOREST, ON THE TRACT PURCHASED BY THE NATIONAL FOREST RESERVATION COMMISSION ON MAY 21.



AS THE RESULT OF PROTECTION FOR NEARLY A QUARTER OF A CENTURY PISGAH FOREST IS WELL STOCKED WITH DEER AND OTHER NATIVE GAME AND THIS GAME WILL BE CAREFULLY PRESERVED.

done with an eye single to immediate returns and wholly without regard for the safety of the forest, and fires had been permitted to burn unchecked. There had been much injudicious clearing of steep upper slopes, which, after a few years of unprofitable cultivation, were generally abandoned to erosion, which in the loose soil and exceptionally heavy rainfall of the region, occurs with remarkable rapidity. But here again forest conservation for nearly a quarter of a century has worked a wonderful change. Stock have been wholly excluded from the forest, careful improvement cuttings aimed primarily at the betterment of its silvicultural condition have been carried forward, and cleared lands unfit for agriculture on account of steepness and thin soil have been planted to trees. Biltmore Forest is today full stocked with a thrifty stand, and producing a steady and increasing yield of firewood and small timbers. The forest plantations set out on denuded lands, which cover in the aggregate about four thousand acres, are among the most successful in America; and Mr. Vanderbilt had the well-

earned gratification of seeing harvested as the product of careful thinnings, logs suitable for box boards, grown from seedlings planted as the result of his forethought over twenty years ago.

I do not want to close this brief account of the first great object lesson in forest conservation in the United States on private lands without a reference to the personality of the man who created and enriched it with each year of his faithful stewardship. Mr. Vanderbilt possessed singular gentleness and nobility of spirit, and had an intense and abiding love for the world out-of-doors. As his life lengthened, he was drawn more and more to long sojourns at Buck Springs Lodge, a log structure within a mile of the top of Mount Pisgah; and probably no scene was so dear to his heart as the view from the Lodge of the green gorge of Big Creek, winding down among a jumble of mountains to the wide valley of the French Broad with the outlines of the Blue Ridge beyond. During the last years of his life, more and more of his pleasure was gained from landscape architecture, of which he was a faithful

student and for which he possessed rare power. He laid out in the vicinity of the Lodge, trails carefully designed to reveal exquisite glimpses of the mountains and these he developed still further, by skillful cuttings which he termed appropriately "painting with the axe." It was a wholesome sight to see this man of great possessions supervising the development of vista cuttings for the disclosure of some view whose latent possibilities his skilled eye alone had detected; and it was characteristic of him, to judge no such achievement complete until it had contributed to the enjoyment of his friends.

The range of Mr. Vanderbilt's charities in the mountain community which owes so much to him, he scrupulously withheld from common knowledge. But the largest of his many contributions to

the general welfare lies in the great and wholesome lesson taught by the activities of his vast estate. For not only did he demonstrate the methods and the practical advantages of forestry for private owners; he was also a pioneer in scientific agriculture, in horticulture and in model dairying. The stimulus afforded by his example towards improved agricultural methods in the South is beyond all estimate.

George W. Vanderbilt earned, and no doubt he will receive, a high place in permanent public recognition of his distinguished public service. Were his admirable conception of the moral responsibility which accompanies the private ownership of natural resources the rule instead of the exception, the conservation problem in America would be already solved.

PISGAH FOREST PURCHASED

ON May 21 the National Forest Reservation Commission formally approved the purchase of Pisgah Forest of 86,700 acres for \$433,500. This price is less per acre than the average of other tracts already acquired although Pisgah Forest has been developed into one of the finest forest properties in the country by the late George W. Vanderbilt.

The purchase was made possible through the generosity of Mrs. Vanderbilt, who accepted a price over \$200,000 less than the one first asked because she desired to perpetuate her husband's pioneer work in forest conservation, and to insure the use and enjoyment of the forest for the American people for all time.

Mrs. Vanderbilt's patriotic feeling in the matter is expressed in her letter to the Commission. She wrote in part:

"Mr. Vanderbilt was the first of the large forest owners in America to adopt the practice of forestry. He has conserved Pisgah Forest from the time he bought it up to his death, a period of

nearly twenty-five years, under the firm conviction that every forest owner owes it to those who follow him to hand down his forest property to them unimpaired by wasteful use. I keenly sympathize with his belief that the private ownership of forest land is a public trust, and I probably realize more keenly than any one else can do how firm was his resolve never to permit injury to the permanent value and usefulness of Pisgah Forest. I wish earnestly to make such disposition of Pisgah Forest as will maintain in the fullest and most permanent way its national value as an object lesson in forestry, as well as its wonderful beauty and charm; and I realize that its ownership by the Nation will alone make its preservation permanent and certain.

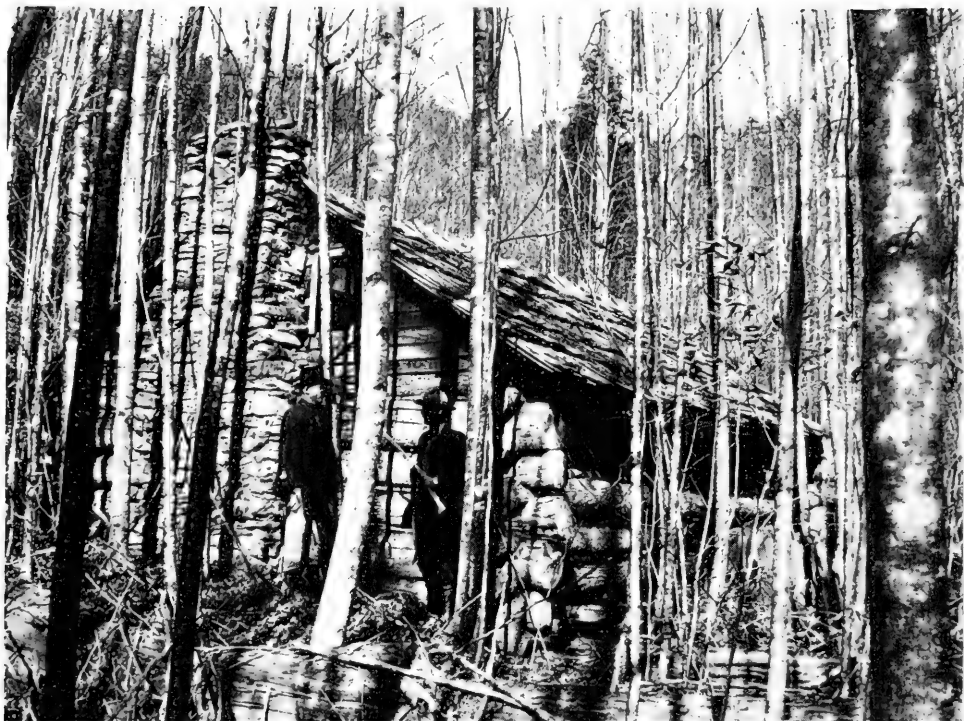
"Accordingly I have decided to make as large a contribution as I can, in order to help bring this result about. I offer Pisgah Forest at a total price over two hundred thousand dollars below that on the basis of which negotiations were entered into with the Government



PISCAGH FOREST CONTAINS MANY MILES OF MOUNTAIN STREAMS IN WHICH RAINBOW TROUT HAVE BEEN SUCCESSFULLY INTRODUCED AND PROTECTED.
THIS IS NOW THE PROPERTY OF THE GOVERNMENT.



LOOKING GLASS FALLS IN PISGAH FOREST, ONE OF ITS MANY SCENIC ATTRACTIONS.



LOGGING CABIN ON BIG CREEK ABOUT THREE MILES BELOW THE VANDERBILT LODGE ON TOP OF
MT. PISGAH.

before my husband's death, my offer to the Government of Pisgah Forest now being at a price of five dollars per acre.

"I make this contribution towards the public ownership of Pisgah Forest with the earnest hope that in this way I may help to perpetuate my husband's pioneer work in forest conservation, and to insure the protection and the use and enjoyment of Pisgah Forest as a National Forest by the American people for all time.

"In the event that my offer is accepted, I shall be glad for the Government to assume control of Pisgah Forest as soon as it may desire. In the same event, it would be a source of very keen gratification to me if the tract retained, as a National Forest, the title of "Pisgah Forest," which my late husband gave it."

GOVERNMENT WILL CONTINUE NAME

In accordance with Mrs. Vanderbilt's desire, the National Forest Reservation Commission will retain the name of

"Pisgah Forest"; in fact, the general area, in which this forest is located and in which other purchases may be made, is already designated as the "Pisgah Area." It is proposed also to make it a game refuge for the preservation of the fauna of the eastern mountains. It is particularly well suited to this purpose since it is already well stocked with game and fish, including deer, turkey, and pheasant, and in the streams rainbow trout and brook trout, with which they have been systematically stocked from year to year.

The tract includes portions of Transylvania, Henderson, Buncombe, and Hayward Counties, in North Carolina. It covers the entire eastern slope and portions of the northern and western slopes of the Pisgah range, one of the most prominent of the southern Appalachians. Its forests influence for the most part tributaries of the French Broad river, which unites with the Holstein river at Knoxville, Tennessee, to form the Tennessee river.

Members of the commission look upon this as the best purchase which has yet been authorized, because the forest is in the finest possible condition and less than three-tenths of one per cent can be classed as burned-over land. The price, too, is lower than the average paid for all lands which have been acquired heretofore.

With this purchase, and with others

approved today, the total area approved for purchase under the Weeks Law in the eastern mountains is 1,077,000 acres. The officers of the commission are the secretaries of war, agriculture, and the interior, Senators Gallinger of New Hampshire and Smith of Maryland, and Congressmen Lee of Georgia and Hawley of Oregon.



TRAIL, CONSTRUCTED BY FOREST SERVICE AT A COST OF \$35 PER MILE IN VIRGINIA. "THE ACTUAL SAVING FROM LOSS ON AREAS PROTECTED FROM FIRE DIRECTLY AS A RESULT OF THE WEEKS LAW, WOULD AMOUNT TO A VERY LARGE AGGREGATE SUM."

Forestry at Chautauqua

MEMBERS of the American Forestry Association, their friends, and all others interested, are invited to attend the mid-summer meeting of the American Forestry Association directors at Chautauqua, New York, on Thursday and Friday, July 9th and 10th.

At this meeting some seven or eight thousand teachers from every state in the Union will be present, and the American Forestry Association has arranged a program of popular addresses on forestry subjects, several of them illustrated with moving pictures and colored lantern slides, by some of the leading forest conservationists of the country.

There are to be four hourly sessions each day in the following order:

11 a.m. In the Amphitheatre.

1:30 p.m. In the Hall of Philosophy.

4:30 p.m. In the Hall of Philosophy.

8 p.m. In the Amphitheatre.

There are to be addresses showing the ways in which forest fires start, the great damage done by them, and how they may be prevented; how logging and milling operations are conducted in the forest; how reforestation takes place; how forest planting is done; the methods by which forestry education is provided; how the public can aid conservation of the forests; how necessary the forests are for the preservation of scenic beauty, for public recreation, for the preservation of streams and the perpetuation of hunting and fishing, and upon all phases of forest conditions.

The meeting will be the greatest public gathering in the cause of forestry that has ever been held in this country and members of the Association are not only urged to attend but to prevail upon their friends to go also.

All information regarding train service and hotel accommodations may be secured from Secretary Arthur E. Bestor at Chautauqua, N. Y., or from the American Forestry Association at Washington, D. C.

EXHIBIT OF FOREST PRODUCTS

FOLLOWING an exhibit at Chicago which proved even a greater success than the most sanguine promoters had expected, the Forest Products Exposition for the last ten days of May duplicated its show at New York City in the Grand Central Palace, and here the Chicago success was actually eclipsed both in point of attendance and general public interest. It is gratifying to state, following the many initial doubts as to whether such an exhibit could be made attractive, profitable and of practical worth, that the response of the exhibitors, in space contracts and in appropriations for impressive, not to say elaborate, displays, were so liberal that success was assured before the doors were opened.

Not only were the displays of the different kinds of woods and of their uses of great value to the contractor, engineer and builder and of artistic interest to the public, but they furnished to the prospective builder ideas and information which will be of great service. In addition, the whole exhibit was of marked educational value and none were more impressed with this than were the teachers from the public and private schools, who, with thousands of their pupils, were present by the courtesy of the managers both at Chicago and in New York.

Aside from the trade exhibits was one by the United States Forest Service which in itself was an education in forestry, lumbering, milling, building and land and water conservation, showing as it did not only how to preserve

the forests but how to use them to the best possible advantage and illustrating with graphic models the amount of waste now contingent upon transferring the tree into ultimate use and the methods by which most of this waste may be avoided. This exhibit attracted particular attention. There was also a most attractive exhibit by the American Wood Preservers Association, where the many samples of treated and untreated woods for various uses indicated in a most impressive manner how greatly the life of woods for railroad ties, block pavements and other uses may be prolonged by the use of various preservatives. A model of a wood-preserving plant showing just how wood is best treated attracted large numbers.

There were also displays by city park and shade tree commissions, by the Y. M. C. A. of its buildings and its work in lumber communities and camps, and the American Forestry Association had an interesting exhibit showing the nature and the value of its work in the forestry cause. The trade displays, of which space does not permit detailed mention, were of great variety, and on most of them many thousands of dollars were spent for what proved to be a very artistic and attractive display.

The undisputed success of the two exhibits should convince the promoters and the exhibitors that it will be well worth their while to have other forest products exhibits in the future, and that other cities will find them as attractive as did Chicago and New York.

Goats For Fire Prevention

Angora goats have been used with profit to keep fire lines clear of inflammable vegetation on national forests in California.

Seed Yield From Cones

Western yellow pine cones, to the amount of 6,377 bushels, obtained on the Bitterroot national forest, Montana, yielded 9,482 pounds of seed. The average cost of the extracted seed was 41 cents per pound.

CORNELL'S FORESTRY BUILDING

COMMODIOUS and thoroughly equipped for the work, the new forestry building of the New York State College of Agriculture at Cornell University was formally opened on May 15 and 16. There gathered for the ceremony foresters from as far west as Missouri and Michigan and as far north as Canada, some seventy-five in all, who participated in the excellent program and enjoyed the opportunity of getting together for both formal and informal talks on forestry questions. The building which was described in the April number of *AMERICAN FORESTRY* is now completed and in use, much to the pride and satisfaction of the faculty and the students.

Chief among the visitors was Dr. B. E. Fernow, who instituted the first forestry school at Cornell a number of years ago only to have it later discontinued by legislative action. The American Forestry Association was represented by its president, Dr. Henry S. Drinker, and by several directors. The Society of American Foresters held a special meeting during the period, and there were representatives of the forestry societies, forest fire protective associations, forest schools and conservation organizations of several States.

Acting director W. A. Stocking, Jr., of the New York State College of Agriculture, formally opened the ceremonies, and three sessions were held on May 15 and one on the following day. Chief Forester Henry S. Graves being absent, Assistant Forester W. B. Greeley spoke on national forestry from the viewpoint of the Forest Service; W. H. Vary, Master of the New York

State Grange, made an address on forestry on the farm, and Charles H. Dow, a director of the Letchworth Park and Arboretum, on forestry as an investment, while C. R. Pettis spoke on the work of the New York State Conservation Commission.

At the afternoon session there were addresses by Prof. James W. Toumey, of the Yale Forest School, on training foresters during the next decade; by F. L. Moore, president of the Empire State Forest Products Association, on lumbering during the next decade; by Dr. Henry S. Drinker, president of the American Forestry Association, on making public opinion in forestry conservation effective and by J. S. Whipple, president of the New York State Forestry Association, on what New York State needs in forestry.

The same evening L. H. Bailey, a former director of the State College of Agriculture, gave a delightfully poetic talk on forestry, and Gifford Pinchot spoke of the national movement in conservation.

The Saturday morning session was devoted to talks on State forestry in the East, by Alfred Gaskill, State Forester of New Jersey; in the Middle West, by Prof. Filibert Roth, of the University of Michigan, and by Dr. Fernow, on the requirements of the Society of American Foresters of its members. This concluded the formal meeting, but in the afternoon the visitors were entertained at the Cornell-Pennsylvania track meet, the Cornell-Princeton baseball game and by a trip up the lake to Crowbar Point, where they enjoyed a camp fire dinner.

A Beautiful Lake

Armstrong Lake, within the Beartooth national forest, Montana, is said to rival the famed Lake Louise of the Canadian Rockies. It lies at an elevation of 7,000 feet surrounded by towering mountains. A good road which can be traveled in half a day by automobile connects it with the railroad at Billings. A rustic hotel has recently been completed and many trails make the surrounding region accessible.



SHEEP RAISED ON A NATIONAL FOREST.

DRIFT FENCES FOR STOCK

IN order to control the movements of sheep and cattle grazed under permits on the national forests, the Government is constructing what are known as drift fences which facilitate the counting and handling of the animals. These fences also help to regulate the time when stock may enter the forests, so that sheep and cattle can be kept off in the early spring until the young grass and other forage plants have had a chance to get a start. In some cases, too, they restrict grazing to certain areas and serve either to protect some grazing grounds or to secure a complete utilization of the forage on others.

The drift fences are not enclosures but generally extend for long distances across the country, much like the "drift fences," or snow fences along railroad rights of way. The railroad fences, however, take their name from the fact that they serve to pile the wind-blown snow to the windward side of the track, so it will not settle in the cuts and impede traffic. The drift fences for stock keep the animals from going in certain directions, or "drifting," to use a cattle-

man's expression, or restrict them to specified areas for the winter and to others for the summer. They may also prevent stock from grazing upon areas where poisonous plants are found; thus they lessen the cost of herding and prevent losses.

Examples of the use of drift fences are furnished in several built on the Dixie forest of Utah, where stock grazing is important. Five miles of drift fences were built by the Government on this forest to protect the water supply of the city of St. George from contamination by forest range cattle. This, with other stretches of substantial wire fence in connection with rocky ledges, which are equally good barriers against stock, makes the southern boundary of one of the divisions of this forest stock proof, except at certain established gateways. During the coming year sixteen miles of fence is to be built across the northern part of this division. This will distinctly separate the northern range from that to the south, which is on an average some 3,000 feet higher and will be used exclusively as summer range. By keeping the stock on the



A SHEEP RANGE ON A COLORADO NATIONAL FOREST.



CATTLE GRAZING ON A NATIONAL FOREST.

separate areas until the forage on the other has had a chance to start, both winter and summer range will be greatly improved and their carrying capacity increased.

Another interesting development is $4\frac{1}{2}$ miles of drift fence on the Fishlake forest in the same state. It was built to keep cattle on the north side and horses on the south where larkspur grows in abundance. Larkspur is very poisonous to cattle, but is not eaten at all by horses. Before this fence was built, 60 cattle had died in one month, June; after it was built and the cattle were excluded from the larkspur areas there was a further loss of only 5, though July and August are considered by cattlemen in Utah the worst months for larkspur poisoning. Forest officers therefore have estimated that this fence, which cost \$740, saved \$2,500 in the first year it was built, and should save \$4,000, or five times its cost, each season. It is said, too, that it increases the carrying capacity of the grazing district about 15 per cent.

Two other fences in the same state, costing \$2,100, will, on a conservative

estimate by the cattlemen, save approximately \$6,000 a year.

In certain areas where the fences will greatly minimize the problems of the forest officers in handling cattle within the national forests, the cost is borne by the Government. In other areas where the benefits to stockmen have been shown they are built in cooperation with the cattle owners, who pay a large part of the expense or furnish the labor. Throughout the national forest states there are cattle and sheep owners' associations which represent individuals who graze their flocks and herds upon the national forests. All differences which arise between the forest officers and the individual owners are submitted to the advisory boards of these associations, and they are therefore clearing houses for the settlement of any difficulties which may need adjustment. According to the officials of the service, these associations have practically eliminated controversies, and the officers who administer them are in perfect accord with the policies of the Government. One of the evidences of this is shown in the drift fences which help both sides.

GRAZING FOR ELEVEN MILLION

LIVESTOCK INCREASES ON NATIONAL FORESTS

FIGURES showing the number of livestock for which the Secretary of Agriculture has authorized grazing permits for the ranges on the 160 National Forests during the year 1914 have just been made public. Nearly eleven million animals can be grazed, including nearly two million head of cattle and horses, nearly nine million head of sheep and goats, and about sixty-five thousand hogs. This means an increase for the current year of about thirty-eight thousand more cattle and horses, and three hundred and forty-seven thousand more sheep and goats, although the gross area of the National Forests at the beginning of 1914 is almost a million

acres less than at the beginning of 1913.

During 1913, according to the reports just compiled, more than twenty-seven thousand stockmen paid the Government for grazing permits on the National Forests.

For several years past the carrying capacity of the National Forest ranges has been slowly rising, which, forest officers say, indicates an improvement in general grazing conditions and a better utilization of the forage resources. They claim that this is due mainly to the enforcement of better methods of distributing and handling stock.

On the lands recently acquired by the Federal Government within the Appalachian region of the east, regulated

grazing has been undertaken this year on six distinct areas. The local stock owners who had previously used the land under lease from the former owners have readily accepted the change of ownership and appear to be favorably impressed with the methods employed by the Forest Service for grazing purposes. While the number of all animals authorized to graze upon these

southern Appalachian forests is not large, it is the belief of the forest officers in charge of them that under careful supervision the lands will support more stock than they have in the past and that there will be considerable improvement in the individual animals, with a constant increase in meat production.

FIRES CAUSED BY LIGHTNING

EXHAUSTIVE inquiry has established the fact that lightning ranks next to railroads as a source of forest fires. Forest officers say that the increasing care with fire on the part of the railroads and the public generally tends to make lightning the largest single contributing cause.

This statement represents a change of view from that held less than a decade ago in this country, when forest journals gravely argued whether lightning caused forest fires, though it was known that trees were the objects most often struck. Trees are said to be oftenest struck simply because they are so numerous, and extending upward, they shorten the distance between the ground and the clouds; further, their branches in the air and roots well into the earth invite electrical discharges.

While certain trees are said to invite lightning, and others to be immune from stroke, it seems to be a fact that any kind of tree will be struck, and the most numerous tree species in any locality is the one most likely to suffer.

Other things being equal, lightning seeks the tallest tree, or an isolated tree, or one on high ground. A deep-

rooted tree is a better conductor than a shallow-rooted one, and a tree full of sap, or wet with rain, is of course a better conductor than a dry one.

Lightning sets fires by igniting the tree itself, particularly when it is dead, or partly decayed and punky, or by igniting the dry humus or duff at its base. The forest soil, when dried out, ignites readily, because it is made of partly decayed twigs and leaves, and it can hold a smoldering fire for a considerable period. It is probable that most of the lightning-set fires start in the duff.

In the mountains of southern California, Arizona, and New Mexico there are likely to be each year a number of electrical disturbances known as "dry thunder storms." They come at the end of the long dry season, and being unaccompanied by rain, are very likely to start many serious fires. For this reason the Forest Service has to keep up its maximum fire-fighting strength in those regions until the rains are fully established. In the plans and organization for fire fighting the service aims particularly to catch these unpreventable lightning-set fires at the time they start.

Planting 858,000 Trees

More than 858,000 young trees are being set out this spring on national forests in Utah and southern Idaho, and the season is reported as particularly favorable to their successful growth.

HALF OF EACH TREE LOST

HALF, or more than half, of each tree is lost in the various stages of manufacture leading to the finished commodities made from it, is the conclusion reached in a report on the wood-using industries of New York State by John T. Harris, of the United States Forest Service, in cooperation with the New York State College of Forestry at Syracuse and published by that institution. This conclusion emphasizes the finding that closer utilization of the forest products is today the greatest problem of the wood-using industries and is of vital importance.

Fifty years ago, when New York led all States in the production of lumber, the report says the problem of waste was almost unknown. At that time the one aim of the superintendent of a plant was to increase the daily output. Today, New York has dropped to twenty-third place among the lumber producing States, and there is increasing need for more efficient consumption of wood material going through the factory. The rapid decline of New York as a leader in lumber production has been accompanied by a relative increase in the demand for forest products. While her annual lumber production is at present over 25,000,000 feet her own forests and woodlots contribute less than one-third of the raw material consumed by her factories.

No problems before the State are more important than the study of closer utilization of forest products, care of the forests, forest fire protection, and reforestation. Of the 34,000,000 acres in the State, 22,000,000 are included in farms and of this, only 15,000,000 acres are actually in crops. This means that 7,000,000 acres of farms are idle; and it is estimated that less than half of the 12,000,000 acres outside of farms, contains merchantable timber. To obtain the most use from all land whatsoever, it is reliably estimated that between 12,000,000 and

14,000,000 acres in the State must eventually be devoted entirely to forests. Such an area is greater than that of Massachusetts, Connecticut, and Rhode Island combined, and is equal to all that part of New York north of the New York Central Line.

Improved forest conditions in this large area would mean an enormous saving to the State. Transportation of raw material from the extreme Southern States, from Canada, and from the West to supply factories in a forest State results of course in duplication and adds to the cost of forest products. Last year there were sent out through the ports of New York State over \$15,000,000 for wood to be used in local New York industries. Practically all of the orders for this imported material should ultimately be cancelled. Twelve million acres or more of forest lands in this State should produce all of the 1,754,519,217 feet consumed by the home wood users. If New York will adopt a sound forest policy she can eventually take her former rank as one of the first States in the production of forest products and supply nearly all of the raw material needed by her factories.

The rapid increase in manufacturing in New York has made an abnormal demand for forest products and a consequent influx of timber from Canada, from the Lake States, and from the southern pine region. Douglas fir also has been shipped entirely across the continent for buildings, bridges, car construction and ship masts. Millions of feet of cypress are shipped all the way from the Gulf States to build tanks and silos; red gum from the lower Mississippi Valley is shipped in for interior finish, taking the places formerly occupied by home-grown oaks, maples and birches; practically all of the better grades of white pine used in the State comes from the Ottawa River District in Canada and from the Lake States. The Pacific Coast is called upon to



Photo by Hugh P. Baker.

BEST TYPE OF VIRGIN FOREST IN THE CENTRAL APPALACHIAN REGION.

MIXED EVERGREENS AND HARDWOODS. UNUSUALLY FINE SPECIMENS OF CUCUMBER TREE IN MIDDLE GROUND.



Photo by Hugh P. Baker.

TYPICAL SCENE IN THE BLACK FOREST OF WESTERN GERMANY.

The Black Forest covers a low mountainous region much like the Adirondacks with many of the same difficulties as to accessibility and market and yet the forest there is managed under the selection system and reproduced by natural means. It is producing as high as \$2 to \$4 per acre per year. Note the large number of stems per acre in comparison with the small number of stems as seen in typical virgin forests of New York.



Photo by H. C. Shuford

AT WORK IN THE WOODS.

The portable saw mill promises to be an important factor in the utilization of future forests in New York. There is really a very large amount of valuable timber standing in woodlots in New York and proper cutting of these woodlots combined with cooperative marketing of products will give farmers and land owners very excellent returns from their hill and ridge lands. It is to be hoped that the use of the portable mill will be developed and that market conditions may be improved by cooperation on the part of woodlot owners.

supply millions of shingles for buildings in New York. The western red cedar is so valuable for shingles that it has practically no competition from the home-grown woods.

Many of the most important wood-using industries of the State, including the manufacturers of planing mill products, boxes and crates, sash, doors, blinds and general millwork, furniture, cars, ships, boats, pianos and organs, get most of their raw material from abroad. The ten leading wood-using industries consume a total of 436,000,000 feet of home-grown wood and purchase from other States the enormous amount of 1,038,000,000 feet. New York's forests and woodlots still contribute to wood-using industries over half a billion feet of lumber annually. This condition can not continue long, however, unless the State takes a more active part in the restocking and preservation of her forest areas, and unless lumbermen and manufacturers utilize the forest products more economically. Two important problems confronting State foresters will be to obtain satisfactory reproduction of the more desirable species in the shortest possible time and to increase the growth to the maximum amount which the soil and situation are capable of producing.

Substantial progress has already been made in the direction of conservation. Three and one-half million acres are enclosed within the so-called "blue line." This line marks the outside boundary of the Adirondack State forest reserve. But of this area the State owns only 1,600,000 acres. Much of the land, except that recently purchased, has been cut or burned over. Improved facilities for fire protection have been recently established. Additional observation towers for locating fires have been built and telephone lines extended.

Excellent work has been done by the New York State Conservation Commission in the matter of reforestation of burned and cut-over lands; and while the amount of planting to date is in the aggregate small, it is a splendid start in the right direction. From two to three cents only per acre are now being expended in the Adirondacks for fire protection. It would be good economy for the State to expend two to three times this amount. Large timber owners in the Northwest spend as high as four to five cents per acre and New York can not afford to spend less.

New York is especially favored among the States climatically and otherwise for the production of forests. Favorable conditions of rainfall and soil for splendid forest development exist throughout the State. It is now known that every acre in the forest areas, where there is any soil whatever, will ultimately produce good forests. There is no reason why the Adirondacks should not eventually be covered with as fine a forest as can now be found anywhere in the Black Forest or other forest regions in Europe. Again, market conditions are unexcelled. The forest sections of the State are well equipped with streams and are easily accessible by rail.

Several suggestions have been made for the protection and proper use of the State's natural resources. These are (1) the repeal of the Constitutional provision forbidding the cutting of trees upon State lands, (2) opening of State forests for recreation places for all the people, (3) an increase of the State's holdings of forest lands, (4) extension of the present system of protection, and (5) the introduction of practical economic methods of reproduction.

Seeking Instruction Here

Zentaro Kawase, professor of forestry at the Imperial University of Tokio, Japan, has been making a tour of the national forests of this country to learn the government's methods of selling timber and of reforestation.

RUSSIA'S FOREST FAMINE

MANY people hold the popular belief that Russia is a country of limitless forests, and the fact that there is a wood famine there may shock them. Such a shock, however, is beneficial as it should awaken in them an appreciation of the efforts being made to perpetuate the forests of this country. The Russian wood famine is so severe that even Moscow suffered from it last winter and a number of public and charitable institutions were insufficiently heated.

Mr. Menshikov tells about the conditions in an article in the St. Petersburg *Novoye Vremya* and the following portions have been translated by *The Literary Digest*:

"For many years, for whole decades, we took no notice of the destruction of the forests. On the contrary, the ruling class, the nobility, hastened to sell out their wooded properties rather than be compelled to sell the land. Those who sold their forests usually did so for trifling sums, giving the brokers an opportunity of earning 300, 500, and even 1,000 per cent on their capital. Those who did not sell their own encouraged the destruction of their neighbors' forests, wisely supposing that the remaining ones would rise in price. In the end the deforestation of the country assumed threatening proportions, and when the clamor raised by the press and learned bodies and chiefly by the landed proprietors themselves became unbearable, the Government introduced a forest-conservation law. But, like the majority of our laws, the conservation was left to the will of God. With the shrewdness of the brokers and the dishonesty of the common citizen, for centuries trained in the art of circumventing the law, forest conservation has in many places been turned into an amusing comedy. The destruction of the forests, even now, goes on in full blast, and the most important of elements which guard the very possibility of man's existence in

the North—the forests which yield fuel—are rapidly disappearing. What would you say if the English should be deprived of the sea, or Switzerland of her mountains? You would say that their end had come. And fire-wood must be considered just as vitally necessary to Russia as the sea is to the English and the mountains to Switzerland. One may regret the disappearance of timber, but that can in a large degree be replaced by brick, iron, and other construction materials. But fuel in the north, in the form of fire-wood, cannot be replaced. . . .

"We take a paper view of the country, and seeing on paper millions of acres of woodland, we feel quite at ease; we have been and still are the richest country in wood. This may be true, but then our forests have remained only in the north. . . . The whole western Russia, recently covered with immense forests, the central provinces, are completely **bared**; and even such regions as Novgorod, Olonetz, Vologda, are being gradually affected. The forests which covered Russia were her natural cloak, serving to warm the people and rendering it possible for them to live in the North. Before our very eyes Russia's cloak is being removed these last fifty years, and our nation remains naked in the midst of a frozen desert. There is a great demand for timber and fire-wood both in Russia and abroad. . . . Speculation in forest land goes on wherever there has remained a shred of the past riches. The conservation laws are being evaded with the greatest care."

Mr. Menshikov concludes with the following burst of pessimistic but patriotic eloquence, whose bitterness seems completely justified by the condition he describes:

"Devoid of its wooded cover, the soil is losing its moisture, the lakes and rivers are drying up; from under the surface barren sands appear, and man,

deprived of fuel, deprived of the products of the natural garden of God, must either degenerate, like the Siberian savages, or flee from Russia. Our nation does both. It degenerates, or more

correctly, freezes like a southern plant brought to the north, and those who are more resolute flee from their fatherland to Siberia, Turkestan, Canada, Australia, Argentina."

WHITE PINES MENACED

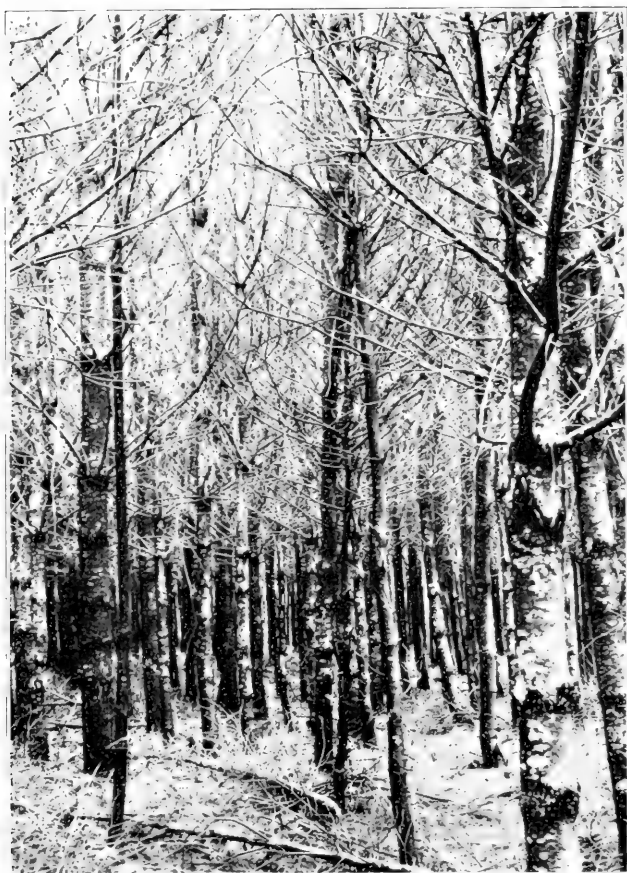
THE white-pine blister rust has such dangerous possibilities for the native white-pine forests of the East that the United States Department of Agriculture recommends earnestly that all trees found affected by this disease be destroyed at once. The disease is most conspicuous during the month of May, and it is recommended that the owners of all white pines which are not definitely known to have grown from seed in their present location make a thorough search of their white pines for this disease. The latter part of May is the best time to search for it in Northern New England and New York, while the first half of May is best for Southern New England and New York and farther south.

The disease appears upon white pines in most localities during the month of May in the form of yellow blisters breaking through the bark of the main stem near the ground. These blisters, after a few days, break open and give forth great numbers of dusty, orange-yellow spores. In rare cases it occurs well up on the trunk of trees which are twenty to twenty-five years of age. A very similar disease occurs at about the same time upon the pitch pine, but it should not be confused with the white-pine blister rust, as it is a native disease which does not attack the five-needled pines. All owners of white pines, either in woodlots or in ornamental plantings, should make a special search for the blister rust of white pine on their property. In case it is believed that this disease is found, specimens should be forwarded to the Office of Investigations

in Forest Pathology in the Bureau of Plant Industry, where an examination will be made, free of charge, and the best possible advice given regarding the eradication of the disease. General, active cooperation of white-pine owners will do much to make effective the efforts of the Department to eradicate this serious enemy of the most important coniferous tree of the East.

It is estimated that at the present time there are present in this country over two and one-half million young white pine trees which were infected by this disease before they left Europe, and which are now present in this country. This disease has an alternate stage of development upon the leaves of various currants and gooseberries. It has been found a number of times in this country occurring upon currants. These occurrences of the disease upon currants in this country are directly traceable to neighboring diseased white pines, as the disease is quite definitely known now not to be carried upon dormant currant stock.

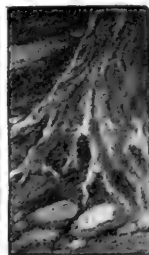
Since the discovery of this disease in 1909, a special effort has been made by various forestry officials and horticultural inspectors of the Eastern States, where the infected imported trees were mostly distributed, to eradicate the disease everywhere that it might be found. It very often occurs in ornamental plantings of private estates, especially upon trees less than twenty-five years of age. The disease is one from which the tree never recovers, so far as now known; hence it is of no advantage to the owner of diseased trees to refuse to remove and destroy the diseased trees.



PLANTED WHITE PINE, SHOWING DOMINANT AND SUPPRESSED TREES

The disease has not yet attacked any of our forests, and if everyone who owns white pines which were brought from some other locality and planted would

make a thorough search as above requested, a great step would be taken toward the eradication of this dangerous disease.



BOY SCOUTS TRAIL BUILDING

THE United States Government, always desiring to educate the public on the subject of the proper use and protection of forests, has found a means to cooperate in a practical way with the Boy Scouts of America. Through arrangements made by the United States Forestry Service, twenty-four Boy Scouts—eight from Washington, D. C., eight from Baltimore, and eight from Boston—are to build this coming summer a ten-mile trail in a remote part of the White Mountain National Forest. The plans for this work and the unusual opportunity it provides for these boys to practice their Scoutcraft and learn something about forestry, and for the government to make more intelligent and vital the interest of boys in practical conservation, are described by Forest Inspector K. W. Woodward, of the United States Forestry Service, in an article which appears, with illustrations, in the June number of *Boys' Life*, the Boy Scouts Magazine. Mr. Woodward says:

"Twenty-four Boy Scouts under the direction of three Scout Masters will build ten miles of trail for the United States Forest Service in the White Mountain National Forest this summer. In return for this work the Boy Scouts will be paid at a rate equivalent to that which the Government would have to pay for the construction of this trail were the work done by the regular force.

"TO CAMP IN THE VALLEY OF WILD RIVER.

"The trail which the Boy Scouts will build is intended primarily as a means of protection against fire. However, it will also be useful in making the White Mountain National Forest more accessible to tourists and prospective timber purchasers, and parts of it may even be used later on in the logging of the timber through which it passes.

"The boys will be working approximately ten miles from the nearest town,

which is Gilead, Me. They will camp in the valley of Wild River, a tributary of the Androscoggin River, and will have two stretches of trail to build.

"The first will be alongside of Wild River and the work will consist merely in the improvement of a rough trail, which needs to be put into condition so that horses can travel over it.

"The second stretch of trail will be located in the timber, where no means of quick travel existed before.

"A PICTURESQUE COUNTRY.

"It is unnecessary to state that the region in which the boys will work, the White Mountains, possesses many scenic attractions. Immediately west of the Wild River Valley is the Carter Moriah Range, which rises abruptly to a height of 5,000 feet. Ten miles west of the boys' camp, as the crow flies, is the summit of the Presidential Range, with Mt. Washington, the highest peak in the White Mountains, standing 6,300 feet above sea level.

"The main stream to which Wild River and the other minor streams in the vicinity are tributary is the Androscoggin, which heads in Maine, flows through New Hampshire and empties into the ocean in Maine. The elevation above sea level along the valley of the Androscoggin is approximately 1,000 feet, so that the rise to three or four thousand feet from this stream to the heights of the high mountains produces very rugged topography. In fact, the greater part of this locality is so steep and rugged that agriculture is of minor importance.

"The forest resources are the main assets. Lumbering is the principal industry, with the business of providing for tourists who are attracted by the mountain scenery second in importance.

"Since the region has been settled for more than 150 years and is one of considerable wealth, many good roads make nearly all parts accessible. Where the topography is so rugged that roads are

too expensive to build, numerous trails make it possible to reach on foot even the steepest mountain peaks.

"WILL SEE WILD ANIMALS.

"As might be supposed from the large area of wild land, this is a region in which the hunting and fishing are very good. However, the Boy Scouts will not be able to do either because they will be at work during the closed season, when it is not legal to hunt or fish for the principal game and food animals. Nevertheless, they may be able to see in the course of their work deer, bear, porcupines, grouse and possibly even wild cats and wolves.

"About the only pest which will detract from the pleasure of life in the mountains will be the mosquitoes. However, mosquitoes are not very numerous.

"TO BEGIN IN JUNE.

"The Boy Scouts will be expected to report to Gorham, N. H., as soon after June 18 as possible. Gorham is the headquarters of the White Mountain National Forest, and from there a train can be taken to Gilead, Me., whence the rest of the journey must be made either with a wagon or on foot. Last summer the Forest Service constructed on the old railroad right of way running up Wild River a road which makes it possible to get about seven miles up into the woods from Gilead. However, this will not be far enough for the Boy Scout camp, so the further distance will have to be covered either by horses or the camp equipment will have to be packed on men's backs.

"Luckily, there is no lack of good drinking water in this locality, and it will not be difficult to find a good camp site close to the work. The sleeping tents and cooking tent can be set up in a circle as far back in the woods as it is

feasible to bring in supplies. The nearest postoffice, Hastings, Me., is about six miles away.

"The trail work itself will consist in clearing out the brush, grading the tread of the trail and building the necessary culverts and bridges. In cases where rock needs to be broken up the Forest Officer who will have charge of this project will use dynamite. The boys will not, of course, be allowed to handle any explosives.

"TIME FOR PLAY AS WELL AS WORK.

"Since there will be about twenty-four boys and it is planned to employ them about a month, there will be ample force so the boys will not have to work more than a part of the day unless they wish to earn extra leisure in order to go on excursions to nearby points of interest. In fact, it should be possible for the boys to see all the attractive bits of scenery in the central part of the White Mountain region. The top of Mt. Washington is about fifteen miles from the camp site and can easily be reached in a day.

"THE VARIOUS ADVANTAGES.

"It is unnecessary to spend much time setting forth the good results which the boys should get out of this trip. They can practice many forms of their Scoutcraft, and will learn how to handle tools, something about forestry and a large measure of self-control. On the part of the Forest Service this departure from the usual method of building trails should also be of advantage because it will bring a large number of intelligent boys into direct contact with the work of the Service. This should help a great deal in educating the boys and their relatives and friends to the work which is being done in conserving the timber resources of the country.

FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER, M. F.

V. GETTING ACQUAINTED

IN SPITE of the fact that we have a number of excellent tree books, some of them localized entirely to the trees found east of the Mississippi, it is a fact that there are so many species to be treated with in these geographical limits that the author has but little space to spare beyond giving identification specifics and a brief mention of the qualities of the wood and the geographical limitations of the species mentioned. Most of these identification characteristics are excellent, and are backed up with superb photographs showing leaves, buds, flowers, bark, trunk and fruit of the tree, or else equally splendid hand drawings; but after all has been said and done, you have but the identification of your tree, you know what he is beyond a doubt, and a few meager facts concerning him—and that is all.

For the forest owner that is not enough. He wants to know something of its light and soil requirements, its rate of growth, when it comes in the spring and its autumn coloration in the fall, whether it has any especial characteristics to warrant saving it in case a clearing or thinning is decided upon, and finally its commercial value, either as lumber or as a source of other forest wealth. Obviously, all this information cannot be crowded within the covers of a volume identifying some three hundred species of trees growing east of the Mississippi in the United States, so it seemed to the writer that the only course in the series of papers would be to concentrate upon some forty-five species distributed fairly evenly over such an area as would contain most of the temperate zone United States species east of the Mississippi, as it is within these limits that most of the

forest estates and country place woodlots are found.

Let us get a little better acquainted with our oaks, our maples, birches, hickories, our elms and our more common evergreens, and let the rest go, assuming that the reader already has one or more good identification books in his library and is able from them to recognize any tree on his place. We will take ten oaks, three maples, two ashes, four birches, two elms, seven miscellaneous broadleaves, six pines, three spruces, two cedars, the balsam fir and the hemlock and see what facts of use to the forest estate owner can be assembled concerning them.

As the oaks are the most numerous and interesting of the broadleaves, we will begin with the ten selected, although almost any forest in any section of the country can show more than ten species of oaks. The family seems to be divided into two groups of cousins, the bristly and pointed leaved ones headed by the Red Oak; and the round-leaved, with the fine old White Oak as the eldest brother.

The family difference seems further accentuated by the fact that all the white oak tribe ripen their acorns the first season and sprout them that same year if possible, while the red oak party ripen theirs the second season after flowering. Further, all the second season oaks have coarse-grained comparatively weak wood which rots quickly next the ground, and the first season oaks have a close-grained, strong, durable wood, some of them like the post oak being so immune from rot that they are named and chosen for fence-post work. As this differentiation is quite general throughout the oak family, it is almost a cast-iron rule that if you come upon one of the red oak group in your forest it cannot be



CORNER OF A COUNTRY ESTATE.

OAKS AND BIRCHES IN PROFUSION MAKE THIS ONE OF THE MOST CHARMING BITS OF FORESTED LAND ON A COUNTRY ESTATE, WHERE THE OWNER DEVOTES SANE ATTENTION TO FORESTRY.

counted on for fence posts, underpinning, mudsills, dam timbers, and the like.

I once knew a young electrical engineer who did not know or else disregarded this rule. There was a fine stand of pin oaks and red oaks growing on his company's property, all straight columnar trees and all of a height. The land had to be cleared for buildings, why not utilize these trees for the electric light and telephone poles of the plant? The older linemen shook their heads, declaring that these trees would soon rot and would be hard to climb as poles, but it looked like a

line work on heavy-power wiring far exceeds the pole cost expense, a little practical forestry knowledge would have saved that engineer a lot of needless expenditure!

In these two groups then, we would assemble, behind the white oak, the swamp white oak, post oak, burr oak, and chestnut oak, while behind the red oak would gather the pin oak, scarlet, black, scrub and black jack. Taking the white oak family first, the head of the clan, the white oak grows throughout the range limits described in our article and is almost universal in its soil tastes. It succeeds admirably in moist,



Fig. 64.—Pin Oak. (*Q. palustris*, D. Roi.)

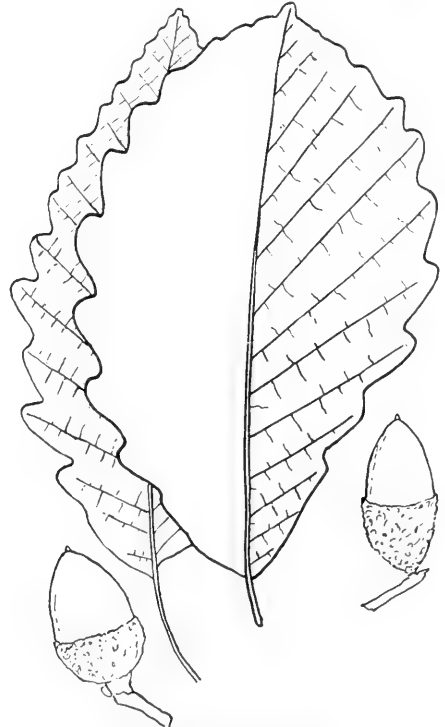


Fig. 57.—Chestnut Oak. (*Q. prinus*, L.)

bargain to find three or four hundred fine telegraph poles already growing on the company's property, so they were all cut down and carefully trimmed, peeled, painted, and tarred for seven feet up from the butt. They then went up as the works electric light and power telephone poles, but within three years from that date every one of them had rotted through just above the base and they all had to come out. As the labor of

sandy loams, even if swampy part of the year; it does equally well on clay base, limestone base and granite base soils and prefers, in any of these bases, rich, well-drained ravine banks or creek bottoms where the spring freshets bring down quantities of silt. It will not thrive in poor or dry soils of any kind, nor in northerly latitudes where its September fall of acorns gets no chance to sprout due to the early winter. If the

gray squirrel is in reasonable abundance, that is, has not been shot out, the white oak will manage even as far north as southern Maine, since the squirrel plants many an acorn which otherwise would get eaten if left on the forest floor over winter. In all the southerly part of its range where the fall comes late and mild winter keeps up until December, the white oak acorns sprout and make quite a growth during the Indian Summer days, and when it is time for its leaves to turn

tree, reaching twelve inches in diameter before its fiftieth year, but in many localities it occurs much less frequently and should be reinforced by nursery specimens at salient points, the cost being about \$1.25 per 7-foot tree. If many are wanted it will pay to run a seed bed of them, transplanting the first year. It is a strikingly handsome tree, both as to bark and foliage, and its color phases are always pleasing. Along about the first of May appear the pretty pink leaf buds, and early in June out



Fig. 55.—Burr Oak. (*Q. macrocarpa*, Michx.)

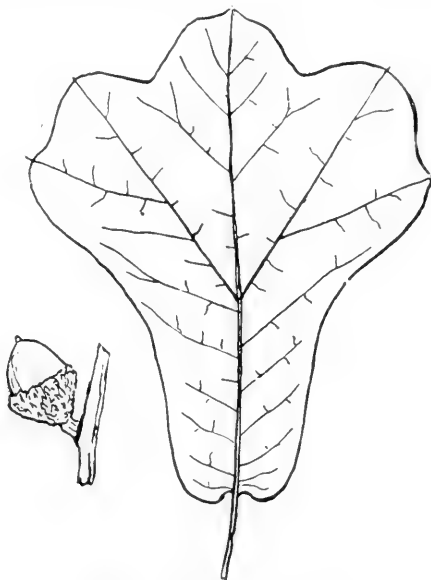


Fig. 59.—Black Jack. (*Q. nigra*, L.)

copper and purple and finally a light yellow brown hanging on all winter, the little seedling has four leaves to show, all of which go through the same changes as the parent tree. In its light requirements the white oak is fairly tolerant at first, but by the tenth year it must have sun for at least part of the time, and after that it must not be over-topped or it will languish. It does not stand transplanting at all from one site in the forest to another, except during its first year, and a nursery specimen, well root-pruned, must be taken when it is 6 to 7 feet high if it is expected to live in its new place.

In the writer's forest Nature has been exceedingly generous with her white oaks, and it is our predominating

come the sap-green catkins which are its flowers. These turn brown in time and drop off and we have a tiny green acorn in being. By September these are in big clusters of large green acorns which turn light yellow and then brown as they fall to the forest floor. Meanwhile the leaves have turned wonderful shades of pale copper and purple about the middle of October, changing to russet brown in November. This passes to a pale yellow-brown during the winter for the leaves hang on all through the snow season, that is a large part of them do, enough to give a fine note of color on a winter landscape, and they are finally pushed off by the oncoming spring buds. Such is the year's calendar for the white oak, always a favorite,

always a joy to the eye; and for my part I can not have too many of them!

Its first cousin, the swamp white oak, is quite different in its habits. You will find it along stream and lake banks, in rich creek bottoms—anywhere where it is never really dry—occurring throughout the northern half of our area. It is as much a characteristic of low-ground, water-inundated landscapes as the red and silver maples, the king nut hickory, the gums and ashes, and the pin oak. So far as I know, nurserymen have not attempted to grow it, but, as

The post oak, second cousin of the white, is easily told from it by its deeply indented leaves, the leaf having a distinct waist so to speak, and its acorn is smaller and rounder with the cup enclosing half of the acorn, growing sessile in pairs on the twigs, while the swamp white oak acorns have a long stem, though its acorn closely resembles the white oak's which has no stem. So there you have an easily remembered identification, even though certain freaks among the leaves may be enough alike to deceive one. The burr

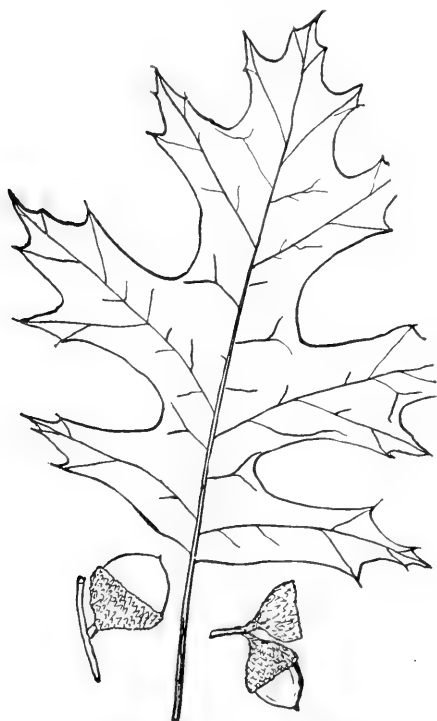


Fig. 61.—Scarlet Oak. (*Q. coccinea*, Wang.)



Fig. 63.—Red Oak. (*Q. rubra*, L.)

it will be an excellent sort to plant where one has cleared some bottom land of trash and thickets, it will be well to grow some of its acorns in the seed bed, for it stands transplanting nicely and will yield you a fine timber classed right in with white oak. It is not a pretty tree, for its leaves turn direct brown yellow in the autumn and its branchlets sweep downward in dense masses, giving the tree a shaggy appearance. The bark is dark, in deep, rough, regular seams.

oak, next in line among the white oak cousins, is the principal western representative in its favorite location of rich moist bottom lands. We do not see many of them here in the east, but in the Ohio and Wabash basins it is common, a magnificent tree, of wood equal to the white oak in commercial qualities. Its leaf looks like a cross between the post oak and the white, having the deep indentations of the post and the numerous lobes of the white. They have a handsome, glossy-green appear-

ance in summer and go direct to brown in autumn. The acorns are large and three-quarters enclosed by a deep cut, with a fringe around the top. An interesting member of the family, and one or two of them at least should find a place in your ravines, grown from the acorn as they are difficult to transplant.

On your high and dry ridges, preferably sandy base soil, you have the star locality for the fifth of the white oak cousins, the chestnut oak,—rather far

all tolerant of shade, and its big leaves enable it to fight vigorously for light, suppressing anything else growing near it and making the most of its trim economical space. This tree only occurs in the eastern part of our area, seldom west of Ohio, probably due to its insistence on hill sides for growing room. I do not see it offered in many nursery-men's catalogues, yet it is one of the easiest transplanted of the oaks and should make a good summer feature for landscape work. It goes right to brown in the fall, and its leaves are soon down, so I should hardly care to spend money upon it when there are so

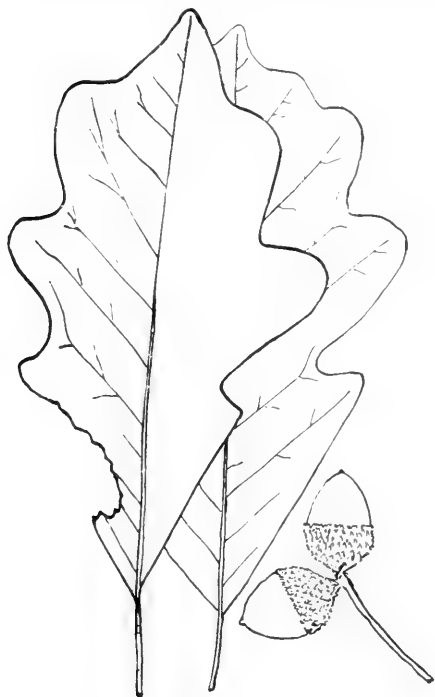


Fig. 56.—Swamp White Oak. (*Q. bicolor*, Willd.)

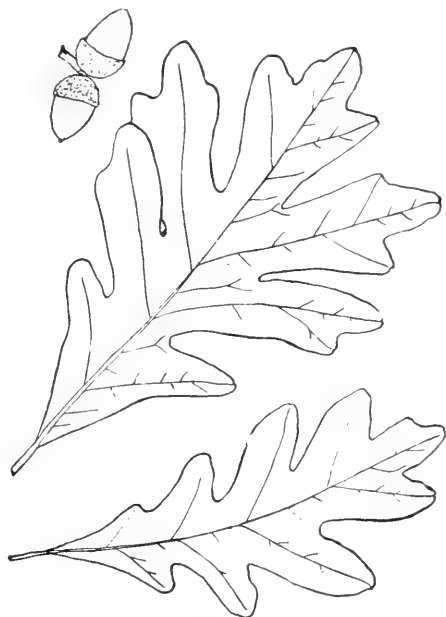


Fig. 53.—White Oak. (*Q. alba*, L.)

removed as it verges closely on the chestnut itself in its characteristics, but is one of the first-year acorn group, with wood of the same characteristics as the rest of the family. There are two species, the rock chestnut, a rather small tree with huge glossy dark green leaves reaching fourteen inches in length and huge oval acorns and the scrub chestnut oak, of lighter bark and smaller leaf and acorn, though with us it grows to very large size on sand base, its preferred soil. The rock chestnut does best on a clay base, and very well on limestone and granite. It is not at

many more ornamental trees for year-round beauty that need room.

As to the dressed appearance of the woods of these five oaks, it would almost take an expert mill man to tell the species apart. Chestnut, burr, post, and white, all show a flower in the quartering, the post oak flower being in narrow parallel lines while the others are wavy and irregular. Swamp white has no flower at all in the quarter grain. Looking at the end of the log, the colors vary from light heart wood in burr, post, and white, to dark in chestnut and swamp white. Planed lengthwise of the grain,

the white shows the closest fibre lines, swamp white more open and broader, and post and burr oak smooth and light with the fibre patterns far apart and hardly distinguishable. In planing any such wood along the grain one is bound to cross the fibre ends on a long slant, leaving rows of what looks like pin-pricks but are the fibre ends crossing the cut at a slant. The straighter the fibres the fewer of these patterns of fibre ends crossed by the plane from which we note that the oak sap fibres vary in straightness from post oak to white oak in a decreasing scale, through this series of five first-year oaks.

We now take up the second branch of the oak clan, the second season oaks ripening their oaks the second year and have chosen five representatives out of the many—the red, black, pin, scarlet and black jack oaks. Except for the last, all of them are characterized by a pointed-lobed leaf, often with the ribs extended like tiny umbrella points to form a bristle at the tip of each projection. Two of them, the scarlet and the pin oaks are favorite nurserymen's oaks, for they color brilliantly in the fall and their graceful feathery foliage is a pleasure to the eye all through the summer. Owing to the pin oak's preference for low, swampy soils, it does not get to bud until late in the spring, usually about the fifth of May.

The red and black oaks, while handsome in summer because of their abundant, glossy dark-green leaves, are not to be relied upon in the autumn, as the red goes right to a dull brown and the leaves fall by the end of October, while the black turns to a deep, dull, reddish-purple and then yellow-brown, which persist all winter from some of the twigs, helping out the white oaks and the beeches to make the winter snowscapes cheerful. As none of these oaks are particularly valuable for their wood, their ornamental considerations would weigh heavily when in doubt as to which to take out and which to leave. For instance, of a clump of scarlet, black and red oaks that had to be would remain with the scarlet. As

thinned, I should certainly take out the red and then the black because of the splendid note of red and orange that this would also be the case with the black and pin oaks, to a lesser degree, they would receive preference in the order named. All three are offered by nurserymen at about a dollar each for 8-ft. trees, well root-pruned, and the pin oak is the easiest of them to transplant. Their soil preferences are, for rich uplands and ridges, red and black oaks; rich, moist river bottoms, red and pin oaks; low swampy soils and rich clay base flat lands, inundated or swampy in the spring, pin oak; dry well-drained sand or limestone base soils, scarlet oak; also clay base if not too wet. For barren, sandy or rocky ridges and hills the black jack and scrub oaks are the principal representatives of the family, almost by preference it would seem, for, while the black jack will do well in company with chestnut oaks and red oaks in rich, rather dry uplands and hills bordering river banks, the scrub or bear oak must have a barren to grow in. Here they put out their stubby club-shaped leaves, scarlet and purple in the autumn, and drop myriads of tiny acorns, a small miniature or the white oak acorn, much prized by bears and wild hogs, red squirrels and wild turkeys. The blackjack goes right to a dull brown in the autumn and comes down soon after the first frosts. It has little value except for firewood, of which it makes one of the best, as its logs burn slowly with a small hot flame,—the campers' delight.

Commercially, pin oaks and red and black oaks are salable as second-grade oak, used for interior trim. The wood works much easier under the saw and plane and the chisel than the white oak grades, and is reddish in color with deep abundant fibre pits. The branchlets of the pin oak are exceedingly hard and tough, and its wood was used by the early settlers for treenails in house building, whence its name pin oak, the nail or pin of the frontier dwelling when iron was scarce. Looking at the ends of the logs, there is a whole lot to be learnt in just studying the sec-



THE WHITE OAK.

tional rings. Both the red and the pin oaks show immense thick rings, not less than a quarter inch from spring wood to spring wood, showing that they are both rapid growers and uniform up to at least forty years of age, when they become more sedate. The red oak is a trifle more reddish in tinge, and in the quarter grain the pin oak surface looks almost like an ash, so deep and pronounced are the dark fibre ends. Planed along the grain, the spacing between fibre patterns is huge, $1\frac{1}{2}$ to 2 inches being common. Except for hardness it would be difficult to tell the two woods apart in the lumber. With the black oak (*Q. tinctoria*) sometimes called

"yellow," and the scarlet oak, the story of the log ends is very different. Multitudes of narrow rings, scarce a sixteenth inch apart, tell of years of slow growth; the quartering shows a close grain and a pretty flower; and, planing along the grain, we get a figure much resembling chestnut. In color a deep red predominates in the scarlet oak and a pink tinge is seen in both quartering and end sections of the black oak.

Growing in forest stands the pin oak is not very impressive, being a columnar tree with quantities of small, tough hanging branchlets, but set out in a field or along a forest wall these same branches spread out until the tree

is pyramidal in shape. With its bright, green, glossy feathery leaves in summer and its glowing colors in the fall the pin oak will always be a favorite. It begins to turn about October 10th and the show lasts until November. Its acorns are small, pretty, round and striped, much prized by birds and squirrels. They do not sprout until the following spring. The black oak is rather hard to tell off-hand from the scarlet, as its leaves and acorns are very much alike. If you dig into the bark, however, with your penknife the story is soon told, for the inner bark of the black or "golden" oak is bright yellow, the best yellow dye in the woods, while the inner bark of the scarlet oak turns red upon exposure to the air. There is some difference in the acorns, too, those of the black oak being larger and more deeply covered by the cup, particularly when young, when it almost encloses the acorn completely. It is important to know which is which, for the scarlet is much the more ornamental tree though always small, while the black gives a good lumber and a reasonable fall coloration.

The red oak you cannot mistake the moment you pick up one of its acorns, for it will be large and blunt ended with a flat cup. The tree is a fast grower in its early years, and if located near a white oak will usually crowd it out and suppress it, but give both trees an equal

chance at the sun, clearing the way ahead and around the white oak to make up for its less abundant leaf area and you will not find more than an inch difference in their diameters in the fiftieth year. The red oak prefers a rather dry clay or limestone base soil; we have few of them in the rich moist sandy base soils of Interlaken, but they are abundant in the red Trenton limestones further west, in the clayey river bottoms of the Middle States, and on granite base in New York. Shade enduring when young, a good fighter for light as it grows up, easily transplanted and like most of the oaks free from insect attack, the red will always hold its own and it has the better acorns of all the bristle-leaved cousins, sprouting the spring after falling, so it has not much trouble reproducing itself. It has no autumn beauty and its wood is second grade, weak and bushy, so I would always favor the white oak in preference to it when growing together, and never could see any reason for our State forest services pushing it ahead of the white oak for plantations simply because it grows much faster at first.

In our next paper we will look over the maples, hickories, ashes, elms and miscellaneous broadleaves as seen from the point of view of the man who owns them and proposes to raise more of the same kind.

(To be continued.)





EDITORIAL

SPEAKERS of the American Forestry Association will on July 9 and 10 at Chautauqua, New York, address some eight or nine thousand teachers from every State in the union, on the necessity for proper care of the forests, for promoting love of trees, for teaching the value of the woodlands for recreational purposes, and for widely diffusing the

doctrine of forest conservation. This is the kind of educational work which meets with a most valuable response, as each of the eight or nine thousand will, in turn, speak to scores; and in hundreds of thousands of youthful minds will be planted a seed of thought which will develop, it is hoped, into an appreciation of the value of trees for their value to mankind.

THIS is the time of year when careful precautions against forest fires may be the means of saving millions of dollars.

The general public can aid materially in this work by taking pains, when in the woods, to quench their camp fires, to avoid throwing lighted cigar and cigarette stubs or burning matches on the ground, and by putting out, if possible, or reporting quickly, any fires which they may discover.

It should be remembered that water is not always necessary to extinguish a fire. Fires may be beaten out with sacks, coats, etc., or may be covered with fresh earth and put out.

Every boy and girl and every man and woman while in or near the woods should be a self-constituted fire warden. Carelessness is responsible for a goodly percentage of the fires, and it proper care is exercised and ordinary precautions taken, it is not difficult to make the fire losses small. Losses by all causes except lightning are practically preventable. While the railroads

are a chief cause of fires, the railroads are doing much in the work of fire prevention by equipping locomotives with spark arresters, by using in heavily wooded districts oil burning locomotives which do not eject sparks, by clearing their right of way for some distance on each side of the tracks, by patrolling sections where fires are likely and by educating train crews to look for, fight and report fires.

In many sections farmers clear off brush grown lots by setting fire to the brush, and this should be done only when the wind is from a safe direction, and even then the fire should be carefully watched and all the flames should be extinguished before night comes.

Every country newspaper, in fact every publication, can be of service, in impressing people with the value of wise precautions against forest fires. Do not forget that forest fires cost an average of seventy human lives, thousands of animal lives and \$25,000,000 in financial loss every year.

EARLY next year, nearly all in January, the legislatures of many States meet. If the American Forestry Association succeeds in its efforts, and there is every likelihood that it will, the legislatures in thirteen States, twelve meeting in January next and one in April next, will be asked to consider forestry laws providing for a State forestry administration, which they now lack.

In some of these States there is little forest growth but in several the forest products form a very considerable portion of the States' wealth and forest departments are vitally necessary.

The American Forestry Association is now proceeding with the campaign

for arousing interest in forestry laws in these States and in showing the people just why they and the State will be benefited by the passage of such laws. If the people are interested the members of the legislatures have to be, and if the people demand forestry laws the legislators have to give such proposed laws their careful consideration.

In four States—Delaware, Louisiana, Tennessee and Alabama—there are workable forest laws, but no appropriations for making these laws effective. The duty of the American Forestry Association in these States is plain, and the Association will continue urging the legislators to provide proper appropriations until they do so.

THE annual report of the Forest Branch, Department of Lands, British Columbia, for 1913, prepared by H. R. MacMillan, gives in a very brief summarized form a glimpse of the enormous progress being made in this province in forest organization. Upon the solid foundation of retention of ownership of all timber lands bearing stands over a certain minimum per acre, which has always been the policy of Canadian provinces, MacMillan has systematized the business of administering these resources according to the best modern office methods, eliminating delays and effecting great economies. The most revolutionary change effected was the organization of eleven forest districts, whose district foresters assumed the immediate charge of all lines of field work in their respective districts, instead of having a number of separate bureaus all operating from one central office. The main lines of work have been supervision of cutting and scaling and collection of royalties on timber leases, classification of lands, and protection from fire, with the construction of permanent improvements which this necessitates. The income from all sources for the province, collected by this department, amounted in 1913 to

\$2,832,788, on a total expenditure of \$245,754.

The effectiveness of this new field organization is manifesting itself in fire protection. The methods found so effectual in the Northwestern States are already well advanced in British Columbia. Last year 11,255 permits were issued for slash and brush burning, and but 17 fires escaped control. The department has assumed complete control of fire patrol along lines of railway construction, the expense being borne by the railroads. Slash burning after lumbering is not compulsory, but the clearing of fire lines is made so, and loggers prefer to burn all the slash rather than build fire lines.

The province shows the same far-sighted policy in land classification for agricultural use as marks the entire land policy of Canada. Touching this policy, the report states: "The policy of land classification is a most important part of land settlement. It protects a permanent source of revenue for the province by ensuring that no bodies of merchantable timber will be acquired except by public sale at a price which guards the public interest, and at the same time it protects the uninformed bona fide settler by preventing him from locating in some timbered non-agricul-

tural tract where he could not be successful." These land examinations are entirely in the hands of the agents of the Forestry Branch.

In the midst of this reorganization the service has found time to send out reconnaissance crews covering 12,308,000 acres in 1913, over little known watersheds. The enormous and undeveloped state of the timber resources of the province is shown by the fact that only 11 million acres of timber limits have been taken up, out of 245 million acres of land. The average area patrolled by a forest guard is 943,396 acres, while a ranger district averages 4,545,454 acres and in all cases exceeds one million acres, or an area as large as the average national forest in the United States. Since the

government owns practically all the land and non-agricultural timber-bearing lands cannot be alienated without examination, it has been considered unnecessary at present to attempt to define and set aside forest reserves as has been done in the eastern provinces.

It would appear from this showing that MacMillan's high ideals in public service, abundant energy, and gift for organization have found a field large enough to satisfy his highest ambitions, and it may not be long before the more eastern provinces, where progress has been held in check by the iron grip of custom, and of politics, may have to look to British Columbia as a model for their own guidance in securing graft-free and progressive forest administration.

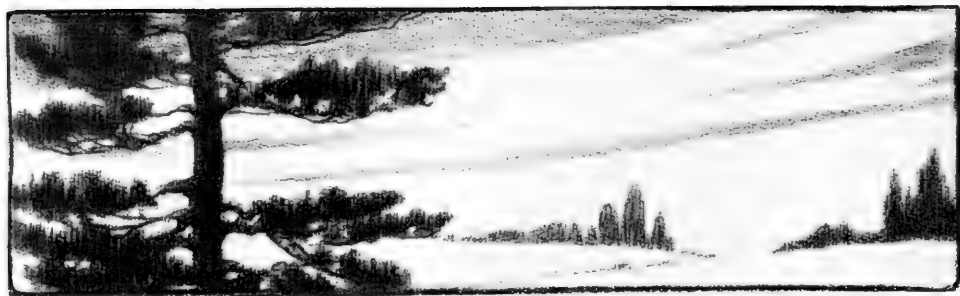
THE Post Office Department has just repeated, in the current postal guide supplement, the instructions through which rural carriers are to report forest fires to the proper authorities during the coming season. These instructions were issued in May, 1912, and during the past two years the cooperation has resulted in the detection and suppression of many fires.

State and federal forest officers will make a special effort this year to get even more value out of the service than has been obtained heretofore. The usual procedure has been for the State fire wardens or federal forest officers to send to the postmasters lists of local wardens and patrolmen, with their addresses and telephone numbers. These lists are given to the carriers with in-

structions to report forest fires to men whose names appear thereon, or to other responsible persons. This year a special effort will be made to follow up the sending out of the lists by having the patrolmen and wardens meet the carriers personally and to take the initiative in arranging such meetings, and also to map out a plan of action to be followed.

Cooperation between the rural carriers and the federal forest officers will be effective in the twenty States in which national forests exist and with State forest officers in the twenty States which have established their own fire protective systems. It is expected that fire services of the carriers will be particularly valuable in helping to protect the new national forest areas in the southern Appalachians.





FOREST NOTES

The first reports of forest fires have begun to come in to Washington from the national forests, and they indicate to the federal officers an early start of the fire season, with unfavorable weather conditions from the very beginning. In the northwest there was less snow on the mountains at the end of the winter than for many years past. Railroad rights of way, which were last year deep in snow, are reported clear now and dry enough to burn readily.

From the Canadian border to Mexico the reports are similar, and there have already been extensive fires in California and Arizona.

The Chief Forester reports, however, that the fire-fighting forces of the service are organized better than ever before, particularly in respect to the fire detection system of lookout stations. By means of these stations fires are reported quickly and accurately, so that the control forces may be on the ground at the earliest possible moment.

In those States where the gravest danger threatens, special efforts are being made by the government foresters and by cooperative fire protection associations organized among timberland owners, to secure care with fire on the part of campers, prospectors, loggers, and by railroads. The Northwestern Forestry and Conservation Association, with headquarters at Portland, Oregon, is one of the leaders in this campaign.

A definite relation between the amount of humus, or vegetable matter in the soil, and its crop-producing power

as shown by yields of corn, is given in figures just issued by the Department of Agriculture. The department therefore advocates the use of various methods to introduce the required humus into the soil.

Experts of the forest service state that the soils of the whole country, and particularly of the South, have lost and are losing immense amounts of this source of soil fertility through forest fires which apparently do little immediate damage but rob the soil of accumulations of humus. In many parts of the South, land is being cleared for farming, and where such forest land has not been burned, there is a large percentage of vegetable matter, which provides considerable fertility, and a good texture. Moreover, this soil has a greater capacity to absorb and retain moisture, and thus is less likely to be washed and gullied under heavy rains. For these reasons, leaving out of account the damage to standing timber, the department's authorities are agreed that fire should be rigidly kept out of woodlands.

The President, upon the recommendation of Secretary Lane, has eliminated from the Toiyabe National Forest in the State of Nevada 38,306 acres of land, of which 38,079 acres is public land, the remainder having heretofore been disposed of under the public land laws.

A similar restoration has been made of 32,740 acres from the Siskiyou National Forest in the State of Oregon,

of which 15,115 acres is public land, the remainder having been heretofore disposed of under the public land laws.

The President, upon Secretary Lane's recommendation, has also signed a Proclamation enlarging the Fillmore National Forest in Utah to the extent of 91,630 acres additional. This action was taken principally in order to secure a better administrative boundary for the forest and to protect the water shed in the vicinity of the town of Beaver. The additional withdrawn land is largely surveyed and unappropriated.

The Canadian Parks Branch has just gotten out a new fire-warning notice for use in the National Parks throughout the Dominion of Canada. These have been prepared in a very striking and attractive form. Formerly such notices were prepared on cloth and were easily destroyed by the weather and not infrequently by porcupines. The new notices, however, are made of tin and the face with baked enamel. These metal notices will withstand any kind of weather and are far superior and much more durable than the old cloth notices. The initial cost is higher, but this is justified when the superior lasting qualities of the tin over that of the cloth notices is taken into account. The lettering is in red and black, sufficiently large to be easily readable at a distance. At the top of the notice is a picture of a forest fire, depicting in a vivid manner the ravage and devastating influence of fires to the timber resources of the country.

These notices have been sent out to the various Park Superintendents and will be posted up in conspicuous places throughout the National Parks.

During the month of April, 1914, a total of 206 acres of land within the Apache National Forest, Arizona, were listed with the Secretary of the Interior and will shortly be opened to entry under the Forest Homestead Act. The lands thus listed were applied for individually by two applicants, and each one of these tracts was examined by a

Forest Officer and found to be more valuable for agriculture than for Forest purposes. Those whose applications within the Apache National Forest were favorably acted upon during the month of April are: H. R. Hynson, Clifton, Arizona; Amos Reamtsma, Eagar, Arizona. In addition to this, 1,329 acres were listed to applicants within other national forests in Arizona, and 1,728 acres within national forests in New Mexico.

The annual meeting of the North Carolina Forestry Association, which was unavoidably postponed from April to June, has been called to meet in Asheville on Wednesday and Thursday, June 10 and 11, 1914. The Appalachian Park Association meets on the same day, and the night session of the Forestry Convention will be held under its auspices.

The program as previously arranged will be carried out as closely as possible. The afternoon drive through the planted forests of the Biltmore Estate and the day's trip through Pisgah Forest to see lumbering under proper forestry control as practiced by the Carr Lumber Company, are still prominent and attractive features of the convention.

The courteous invitation of the Champion Fiber Company to visit their pulp mill at Canton is still open, and no doubt many delegates will avail themselves of this opportunity to see one of the largest and most interesting factories of its kind in the country.

The recently appointed members of the Forestry Committee of the National Wholesale Lumber Dealers Association are J. R. Williams, Jr., Chairman, care of J. Randall Williams & Co., Philadelphia, Pa.; E. A. Selfridge, Jr., Northwestern Redwood Co., Willits, Cal.; J. V. Stimson, Huntingburg, Ind.; E. N. Wheeler, Wheeler & Dusenbury, Endeavor, Pa.; W. R. Butler, W. R. Butler & Co., Boston, Mass.; J. S. Gillies, Gillies Brothers' Lumber Co., Braeside, Ont.; J. B. White, Riordon Paper

Co., Ltd., Montreal, Quebec; Horton Corwin, Jr., Branning Mfg. Co., Eden-ton, N. C.

The Advisory Committee to represent this Association to the American Forestry Association is composed of R. C. Lippincott, Chairman, Crozer Bldg., Philadelphia, Pa.; John M. Woods, John M. Woods & Co., Boston, Mass.; R. L. Sisson, A. Sherman Lumber Company, Potsdam, N. Y.

At the request of Senator Thomas and Representative Taylor, of Colorado, the President has withdrawn from entry numerous tracts of lands lying west of the City of Denver, pending the passage of two bills in Congress, whose passage has been recommended by Secretary Lane, to extend the park plan of Denver. The purpose is to beautify these tracts for use as one of the scenic features of the city. A boulevard is to be constructed by the city to the land. The proposed legislation will add 9,000 acres to the Pike National Forest and grant 7,000 acres to the city.

Among the exhibits at the Forest Products Exposition in Chicago was one of a metal basket for the feeding of wild birds which attracted much attention from the many interested in the preservation of the birds. It was invented by Charles E. White and is intended particularly for feeding suet or other fats which are so tempting to wild birds. The basket is so arranged that it can readily be fastened to a tree and easily refilled, and it permits the birds to get their fill of the food without being able to carry away large pieces of it. It is proving most effective in coaxing wild birds to remain in localities where they are desired.

Students of the New York State College of Forestry at Syracuse during the past spring have planted as a part of their laboratory work over 100,000 forest trees; 55,000 trees were planted at Richland and Kasoag in Oswego County; 20,000 were put out on the Chitte-

nango Forest Station at North Chittenango; 16,000 on the Salamanca Forest Station, and 12,000 were planted around the City Reservoir at Fayetteville. Thirty college boys planted 55,000 trees at Richland in a little less than three days.

Theodore S. Woolsey, Jr., one of the leading American foresters of the younger group, has a 37-page paper on "Austrian Forestry" in the last number of the "Society of American Foresters' Proceedings." This paper is finely illustrated, very complete and full of value for Americans.

Ground has just been broken for the State Forestry Building on the Campus of Syracuse University. In 1913 the State appropriated \$250,000 for the State Forestry Building for the State College of Forestry, and it is expected that it will be ready for occupancy in the summer of 1915. The building when completed will be the finest Forestry building in the United States and the only building erected by any State east of the Mississippi as a State Forestry building.

A special wood rule, known as a Biltmore or Cruiser stick, is now being used extensively in government forestry work. There are four or five different styles of this stick in use, but in form most of them are similar to common flat wood rules, though some have one beveled face. They range in length from two to four feet and are made by the Lufkin Rule Co., of Saginaw, Mich. Some of them are simply adapted to determining the diameter of standing trees and some of them are so graduated that in addition to giving diameters, they can be used to estimate the height of standing trees and have also one tier of log rule figures on them, so that board contents of logs 16 feet or multiples thereof in length can be arrived at.

North Carolina is issuing separate reports of the forest resources of each

county in the State. So far, the State has already published those of the western mountainous portion, and is now getting out bulletins on the counties in the Piedmont region.

The work is being done by the forestry division of the geological and economic survey of North Carolina, and each report is a concise statement occupying less than four printed pages. It is intended by the survey that these reports of individual counties may be reprinted by the local newspapers, because in that way the specific local information will be given to the people in the cheapest and most direct way.

The Government has just offered for sale two tracts of timber on Lolo Creek within the Clearwater National Forest, Idaho, aggregating 600 million feet of saw timber and 350 thousand cedar poles, together with a considerable amount of material for piling, shingles, and posts. A large part of the timber is Idaho white pine, but the stands include yellow pine, lodgepole, spruce, western larch, Douglas fir, cedar, and white fir. The prices, which represent the lowest rates which will be considered for the saw timber, range from \$3.50 for green white pine to 50 cents a thousand for Douglas fir, western larch, and cedar. The prices of poles range from 5 cents to \$2.40 apiece, depending upon the size.

Full particulars may be obtained from the District Forester, at Missoula,

Montana, or from the Forest Supervisor at Orofino, Idaho.

Nearly 17,000 acres have just been added by act of Congress to the Caribou National Forest, Idaho. This is one of the first of such additions through congressional action, and is the largest so far made by direct legislation.

Those who have followed the National Forest movement in this country will recall that most of the forests have been created through presidential proclamation, which set aside, for timber growing or for water protection, certain areas of the public domain. In March, 1907, however, Congress passed a law that no further additions should be made to the National Forest areas in the States of Colorado, Idaho, Montana, Oregon, Washington, and Wyoming, except through congressional action.

Since July, 1909, residents of the city of Montpelier, Idaho, have been petitioning to have this 17,000 acres added to the Caribou National Forest, because the area includes the watershed of the stream which furnishes the city's water supply. Not being within a National Forest, the tract was given over to unregulated grazing and other usages which resulted in stream pollution and became a serious menace to health. The citizens of Montpelier, at several times subsequent to their first efforts in 1909, renewed their petition; and the act just passed represents the successful outcome of their efforts.

Fire Rangers Use Steel Towers.

The steel towers that support electric power transmission lines are being increasingly used by forest rangers as fire lookout stations on national forests. With the harnessing of the mountain streams a network of these lines is gradually being woven over the forests and in the absence of other convenient lookouts, the rangers find the steel towers helpful in their fire patrol work.

New Fire Fighting Tool.

A tool used to fight fires on the California forests combines a rake, spade and hoe. It is compact so that it can be carried on horseback, and weighs less than 5½ pounds.



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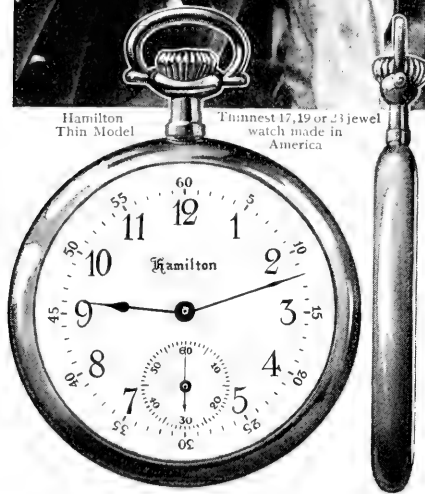
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American Forestry

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Vol. 20

JULY, 1914

No. 7

UNLOCKING ALASKA

NUMEROUS FOREST FIRES

A CITY'S TREE WORK

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FORESTRY ON THE COUNTRY ESTATE

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The Magazine of the American Forestry Association

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CONTENTS

1914

UNLOCKING ALASKA.....	469
With 24 illustrations.	
THE WORLD'S OLDEST TREE.....	486
With one illustration.	
A CITY'S TREE WORK.....	489
With eight illustrations.	
RANGER YOUNG WILD, ON THE FIRE LINE, OR LARIAT LAURA'S FATAL FORM—By E. T. Allen.....	496
DESTROY DISEASED PINES	498
LUMBER TRADE AND THE CANAL—By Robert Dollar.....	499
PACIFIC COAST CONDITIONS.....	500
FORESTRY ON THE COUNTRY ESTATE—By Warren H. Miller.....	501
With ten illustrations.	
BALSAM FIR FOR PULP.....	509
With three illustrations.	
AN ACKNOWLEDGMENT	510
FOREST SERVICE AND PUBLIC—By J. G. Redington.....	511
With two illustrations.	
SCENIC FOREST PRESERVED.....	513
A LUMBERMAN'S VIEWS.....	514
NUMEROUS FOREST FIRES.....	516
With five illustrations.	
THIRTY-THREE THOUSAND ACRES MORE.....	523
PHILIPPINE FOREST CONCESSIONS.....	524
WHITE MOUNTAIN CONFERENCE	525
NEW STYLE SHEEP HERDING.....	526
THE WRATH OF THE RIVER—A poem—By Rachel L. Dithridge.....	527
INJURY TO THE LARCH BY SAWFLY LARVAE—By Maud DeWitt Pearl.....	528
THE CANADIAN DEPARTMENT—By Elwood Wilson.....	529
EDITORIAL	531
FOREST NOTES	534
NEW BOOKS RECEIVED.....	538
CURRENT LITERATURE	539

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Declaration of Principles and Policy of the American Forestry Association

- IT IS A VOLUNTARY** organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.
- IT IS INDEPENDENT**, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.
- IT ASSERTS THAT** forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.
- IT DECLARES THAT FORESTRY** is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,-000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.
- IT RECOGNIZES THAT** forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.
- IT WILL DEVOTE** its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies:

- FEDERAL ADMINISTRATION AND MANAGEMENT** of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.
- STATE ACTIVITY** by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.
- FOREST FIRE PROTECTION** by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.
- FOREST PLANTING** by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.
- FOREST TAXATION REFORMS** removing unjust burdens from owners of growing timber.
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- EQUAL PROTECTION** to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.
- CLASSIFICATION** by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

American Forestry

VOL XX

JULY, 1914

No. 7

UNLOCKING ALASKA

IN SPITE of the fact that Alaska has belonged to the United States since 1867, and in the face of the great advertisement which this immense territory got in a few years following its gold exploitation some eighteen years ago, when treasure-seekers from every part of the United States visited it, the ordinary citizen is surprisingly deficient in knowledge of the country and its wonderful resources.

To some it is a land of glaciers and ice; others picture it as a vast area of tundra and mosquitoes; others, more recently since the devastation of Kadiak Island, think it is blanketed with volcanic ash. Still others, having read glowing accounts of the agricultural experiment station, have changed their point of view to allow for large possibilities of fruits, grains, and vegetables. Jack London has long since persuaded many that all is snow and ice, glacier and freezing streams, dog teams and abysmal brutes of men, supernatural in height, breadth, strength, and toughness.

In short, the individual conception of Alaska varies in direct ratio to what one has read. Yet only a few who visit it can have an adequate conception of all it means. The revenue cutter officers who guess their way about from fog to fog in bleak Bering Sea know one side of it, which they have celebrated in a Bering Sea Hymn. This hymn has some sixty-nine odd verses—some more odd than others—to say nothing of the chorus religiously repeated at the end of each. The song is not complimentary, and the final verse goes as follows, with variations:

“And when they sound my last farewell
They'll say I've had my share of—
Well,—

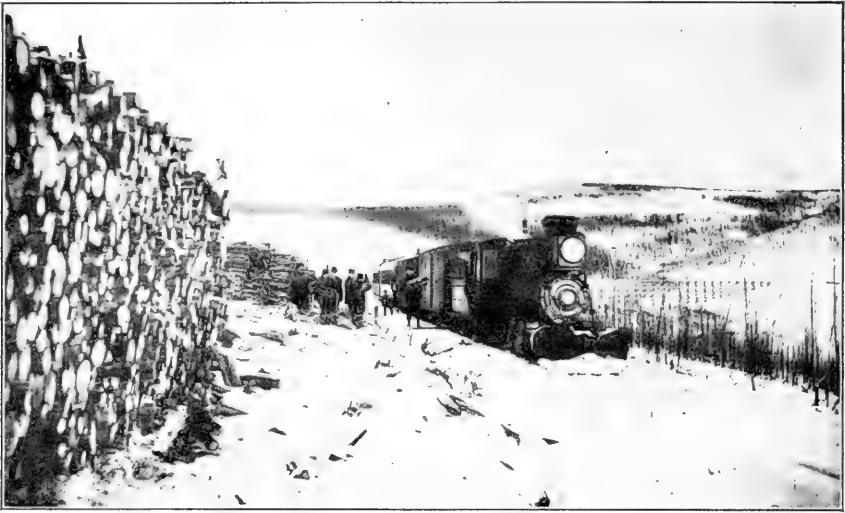
My welcome sure in heaven will be
For I have sailed the Bering Sea!”

Scientists of the Geological Survey perhaps know it best of all, because they have explored it from one end to the other, for everything from gold, copper, and coal to fossil mammoths and mastodons.

As a matter of fact, an individual has less chance of knowing much about Alaska than about the United States. In the first place, the transportation facilities are decidedly primitive. In the second place, Alaska is so large! Few realize that it is about as far from southeastern Alaska to the end of the Aleutian chain as it is from Jacksonville, Florida, to Los Angeles; and from north to south is farther than from the Great Lakes to the Gulf of Mexico. Its range of temperature is equally great—greater indeed than that from Florida to Maine!

And now that Congress has furnished the key, by authorizing the building of a Government railroad at a cost of \$35,000,000, Alaska is to be unlocked and her immensely valuable natural resources are to be open for the uses of civilization.

While it will take all of this year and probably longer to complete surveys and select the route for the railroad, and fully four or five more years to finish the road, the manner in which the great country's resources are to be best managed and controlled for the benefit of all the people is already inspiring proposals for legislation.



"WOODING UP" THE ENGINE ON THE TANANA VALLEY RAILROAD NEAR FAIRBANKS. REMNANT OF ORIGINAL FOREST, MOSTLY FIRE-KILLED.

Secretary of the Interior Franklin K. Lane, in a report on Alaskan conditions recently sent to Senator Key Pittman and Congressman William C. Houston, chairmen of the Senate and House committees on Territories, respectively, urges the creation of a Development Board to have complete control of the natural resources of Alaska, and makes a severe arraignment of the present red tape methods in the administration of Government affairs in that territory. Bills for the creation of boards or commissions to administer the Government of Alaska, have been introduced in the Senate by Senator Chamberlain of Oregon, and in the House by Delegate Wickersham, of Alaska. These bills differ only in detail, and the general purpose and scope of both is in accord with the recommendations of Secretary Lane.

The Development Board plan urged by the Secretary provides for a board of three members, appointed by the President and confirmed by the Senate, which is to have headquarters in Alaska, and is to be charged with the general conduct of all governmental affairs there connected with the natural resources and development of the country.

"It is proposed and urged," says Mr.

Lane, "that the board should take over such authority now exercised by various departments and bureaus as may be necessary to give it supervision over practically the entire public domain and all the natural resources of Alaska, and control of such activities as are closely related and essential to the development of the physical resources of the country. The board would do the work now done in Alaska by the General Land Office, the Forest Service, the Road Commission, the Bureau of Mines, the Bureau of Education, and the Secretary of the Interior. It should take over a part of the work and authority of the Bureau of Fisheries. * * * Beginning at the shore line, the development board should have complete control of all governmental activities and interests connected with the development of industries and transportation and the settling of the country.

"This should include the control of water powers, building and maintenance of roads and trails, and operation and rates of the railroads and telegraph lines. It should include protection and control of game, fur-bearing animals, public lands, mineral deposits, coal, oil, gas, hot springs, timber lands and timber." Secretary Lane also urges that this board should take over the super-



A REINDEER HARNESSSED.

THE MOST USEFUL DOMESTIC ANIMAL IN ALASKA, CAPABLE OF PULLING A GOOD SIZED LOAD AND ALSO PROVIDING THE MEAT SUPPLY OF THE GREAT COUNTRY.

vision of educational work among the Indians and natives, the reindeer industry, control of the surveyor-general's office, and the supervision, in cooperation with the Department of Agriculture, of agricultural experiments and demonstration work in the territory.

FOREST SERVICE EFFICIENT

While many are in favor of this plan of Secretary Lane's, there is also a great deal of opposition to it. For instance, it is generally recognized that the administration of the forested lands in Alaska under its control, by the For-



ONE WAY OF TRAVELING.

THE REINDEER SLED IS NOT LIKELY TO BE SUPERSEDED BY ANY RAILROAD AS THE REINDEER IS TO ALASKA WHAT THE HORSE IS TO THE UNITED STATES.



Photograph by A. S. Hitchcock.

VIEW OF SITKA AND SURROUNDING FOREST COVERED SLOPES.

est Service, has been particularly efficient and satisfactory. There have been none of the long delays in rendering decisions on matters in dispute that have caused criticism of other departments. Practically all questions relative to the forests have been settled on the ground by the officials in charge, and when it has been necessary to refer to headquarters in Washington, replies have been received in about the same time they could be sent to national forests in Oregon and Washington.

Hence many people do not believe that it would be possible for such a Development Board as Secretary Lane proposes, to manage the forests of Alaska in as able and as efficient a manner as they are being handled at the present time by the well-trained men of the Forest Service. Certain cooperation between the Forest Service, still in control of the administration of these Alaskan forests, and such a Development Board, if one is created, would undoubtedly be valuable and altogether satisfactory, but there is likely to be decided opposition in the Senate and

House by the friends of forestry to any bills eliminating the Forest Service from administrative control of the forests of Alaska.

TIED BY RED TAPE

It is pointed out in Secretary Lane's report that at present each of at least a score of government bureaus in Washington, divided among the various departments, have something to do with the government of Alaska, and that there is a vast amount of red tape and circumlocution in the administration of public affairs under this system. Instances are given in the report of delays of several years in the handling of uncomplicated land and other matters which should have been promptly disposed of.

"Practically all the lands and natural resources of Alaska," says the Secretary, "are still the property of the United States. Until now, we have only protected these riches against monopoly and waste, and the most cumbersome departmental machinery has sufficed. Heretofore we have done lit-



HERD OF REINDEER.

IT IS PREDICTED THAT THESE ANIMALS WILL BE THE SOURCE OF MUCH OF THE WEALTH OF ALASKA.

tle more in Alaska than keep a few policemen stationed at closed doors, to prevent breaking and entering. Now that we are to open the doors, we need more than a police force. Mineral and other resources must be opened to use; the lands must be opened to settlement. There must be such administration of the laws as will give prompt and ready assistance, unhampered by red tape and unnecessary delays, to honest settlers, while protecting fully the rights of the nation against monopoly, fraud and waste.

"We are to encourage the building of industries and commerce, and the making of homes and farms, in the new territory. To do this, we must plan and build systems of roads and trails, to connect the railroads, the seaports, towns and farms. We must plan the location of towns and provide facilities for settlement. Fuel and power must be made available for domestic and industrial uses. Revenues must be provided without discouragement to settlement and industry, and there should be no bar to efforts for simplifying and bettering taxation methods.

"There must be new and simple machinery for the successful working out of this program. * * * The new policy is not to invite a few men to ex-

ploit the cream of Alaska's riches, but to develop all the resources and possibilities of the territory harmoniously, for the best interests of both the people who go to Alaska, and the people of the United States who own this great public domain.

"Alaska's problems are largely peculiar to Alaska. Our present system of government there is heterologous. Instead of one government in Alaska we have a number, interlocked, overlapped, cumbersome and confusing.

"There is a government of the forests, a government of the fisheries, one of the reindeer and natives, another of the cables and telegraphs. There is a government for certain public lands and forests, another for other lands and forests. Each of these governments is intent upon its own particular business, jealous of its own success and prerogative, and all are more or less unrelated and independent in their operation. Experience has demonstrated that efficient administration is best secured by centralizing responsibility and authority in the hands of a few men, who can be held to strict accountability for the results of their actions. The proposed Development Board for Alaska follows this modern and well-tested plan for securing efficient administration."

SOME INSTANCES GIVEN

Secretary Lane points out some of the red tape caused by the present division and multiplication of authority in Alaska.

In many instances it is apparent that the management of the forests by the Forest Service is noticeably free from red tape and is productive of the best possible results under the existing laws and conditions.



ESKIMO MOTHER AND BABE.

Secretary Lane says: "There is one procedure for making homestead, mineral and other land entries within the National Forests; another procedure for making such entries in lands outside the forests reserves. Water power and power sites within the forest reserves are leased and operated under permits from the Forest Service; there is question as to whether authority exists for disposal or leasing of water powers elsewhere in Alaska.

"A citizen who wanted to lease an island for fox farming, carried on a correspondence with three different departments, for several months, in an effort to learn which had jurisdiction and authority to make the lease. It was finally decided that none of them possessed this authority. Certain islands along the south coast of Alaska may be

leased by the Department of Commerce; adjoining unreserved islands may not be leased, but may be acquired under the general land laws, from the Department of the Interior. Still other islands are reserved for special purposes, under the control of the Department of Agriculture.

"Vast areas in the forest reserves are entirely untimbered, but are held under the regulations of the Forest Service,



THE PROUD FATHER.

HIS CLOTHING IS MADE OF REINDEER SKIN WHICH WITH ITS LONG HAIR IS WARM AND COMFORTABLE.

while timbered lands in other sections are unprotected.

"Mineral claims within the forest reserves must be investigated and approved by the Forest Service before the General Land Office may grant patents. Homesteads within the forest reserves are surveyed by the Forest Service without cost to the entryman. Homesteaders on unsurveyed land outside the for-



AN ALASKAN SCHOOL HOUSE.

THIS IS THE UNITED STATES PUBLIC SCHOOL AT POINT BARRON, ALASKA. IT IS NEARER THE NORTH POLE THAN ANY SCHOOL HOUSE IN THE WORLD.

est reserves must pay for their own surveys.

"Timber in the National forests is sold at auction, under rules and regulations of the Department of Agriculture. Timber on other public lands is sold under different rules and regulations, made by the Interior Department.

"Roads and trails within the forest reserves are built by the Forest Service. Roads and trails outside these reserves are built by a commission of army officers.

"The general laws forbid the exportation of timber cut off public lands in Alaska, but permit exportation of pulp

made from such timber. There is no prohibition against exportation of timber cut in the forest reserves.

THE GAME RESERVES

"Many islands frequented by birds are set aside as game reserves, and are under the protection of the Biological Survey, which sends a keeper in the summer to guard some of the islands. Game animals throughout Alaska are protected by wardens hired by and under the direction of the Governor of Alaska, who enforce regulations made by the Department of Agriculture, and are paid from an appropriation made to and disbursed by the Department of the



AN INDIAN CEMETERY.

THIS IS ON THE HIGH ROCKY POINT AT UNLATO ALONG THE YUKON RIVER.



SALMON DRYING.

THIS FISHERY AND VILLAGE IS THAT OF HOUDEN ON THE SHORE OF THE YUKON RIVER AND FIFTY MILES ABOVE KAYUKUK.

Interior. Fur-bearing animals are under the protection of wardens appointed by the Secretary of Commerce and work under regulations made by the Department of Commerce. Game animals are deer, moose, caribou, mountain sheep, mountain goats, brown bears, sea lions and walruses. Fur-bearing animals comprise rabbits, squirrels, wolves, lynx, mink, otter, beaver, foxes and black bears.

FISH PROTECTION

"The Bureau of Fisheries employs one warden and five deputy wardens for the protection of fur-bearing animals in the territory. Game wardens are appointed by the governor, and rangers and other officers of the Forest Service are authorized by the governor to also act as game wardens. The governor's game wardens have also been appointed by the Bureau of Fisheries to protect fur-bearing animals, but at present only one person is serving in this dual capacity. Forest rangers, however, are not charged with protection of fur-bearing animals, and the wardens and deputies of the Bureau of Fisheries have no authority over the protection of game."

Secretary Lane refers to the incon-

gruity of the laws which distinguish between black and brown bears, although both may be born in the same litter, and to the protection of the giant brown bears on Kadiak Island, which are a menace to domestic animals and even human life. He also refers to the inadequacy of the inspection of fisheries in the territory. He proposes that the salmon fisheries and hatcheries, and the seal industry on the Pribilof Islands, should continue to be under the control of the Bureau of Fisheries, but that everything having to do with land and natural resources, beginning at the shore line, should be placed under the direction of the proposed Development Board.

Mr. Lane points out that there are now only 862 miles of wagon roads, 617 miles of sled roads, and 2,166 miles of trails in the whole of Alaska, for the construction and maintenance of which about \$2,600,000 has been spent. He urges that roads and trails are as essential to the opening of Alaska to settlement, as railroads, and that these roads for several years to come must be built by the government.

The reindeer industry, now monopolized by the natives, Mr. Lane looks upon as the beginning of a great indus-

try which may have something to do with solving the meat supply problem of the United States.

CABLE AND TELEGRAPH

The Secretary discusses at considerable length the cable and telegraph system in Alaska, now operated by the Signal Corps of the War Department, and proposes that this should probably be managed by the Development Board. This system comprises the ocean cable from Seattle to Sitka, which the Secretary says must soon be replaced with a new cable to cost about a million dollars, unless a way can be found for substituting wireless service for this cable. The present military telegraph system includes, besides the cable, 1,064 miles of land lines and ten wireless stations. These latter do not include the seven wireless stations in Alaska maintained by the Navy Department. The Secretary quotes figures to show that it costs about \$400,000 a year now to maintain and operate the cable and telegraph system, and that this service is about self-supporting, if the government business transacted is charged up at commercial rates. Referring to a demand in Alaska for lower telegraph rates, he says: "This demand should, of course, be considered seriously, as the experience of the Post Office is to the effect

that reduction in rates makes for larger business and bigger revenues."

It is pointed out in the report that under present conditions it is difficult to



ON THE SCHOOL FARM.

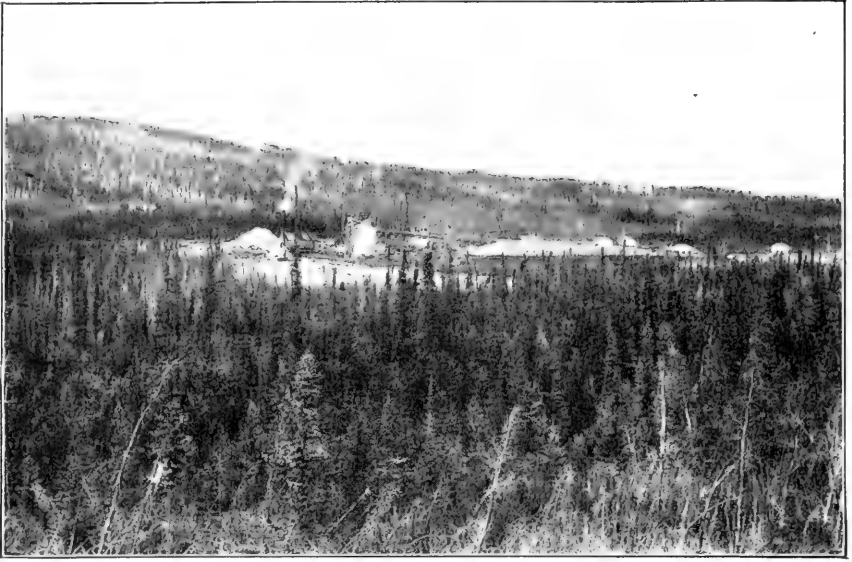
This field of oats was sowed as late as June 11, on the school farm at Klukwan, Alaska. Agriculture is taught in those parts of Alaska where climatic conditions permit.

secure accurate information as to Alaskan revenues and disbursements, because they are handled by so many agencies. He advocates an Alaskan



ST. MICHAELS, ALASKA.

THIS IS A FAMOUS SHIPPING POINT FOR YUKON RIVER TRAFFIC. THE PICTURE IS MADE FROM A PRINT LOANED BY THE NORTHERN NAVIGATION CO. OF SAN FRANCISCO, CAL.



TYPICAL MINING OPERATION ON ENGINEER CREEK NEAR FAIRBANKS. SMALL BLACK SPRUCE IN THE FOREGROUND; PARTIALLY FIRE-KILLED BIRCH AND ASPEN ON SLOPE IN THE BACKGROUND.

budget, in which all Alaska funds can be reported and accounted for on a single page. A detailed statement of Alaskan receipts and expenditures for 1913, not including those of the territorial government, is contained in the report, which shows that the receipts

were \$802,613.65 and the expenditures \$5,029,980.37. The expenditures include \$314,051.49 for the Treasury Department, \$54,224.37 of the Navy Department, \$2,247,494.13 by the War Department, \$552,898.82 by the Post Of-



TYPICAL FLUME AND SLUICE BOXES USED IN PLACER MINING FOR GOLD IN THE FAIRBANKS DISTRICT. MUCH LUMBER AND MANY POLES ARE REQUIRED FOR THESE PURPOSES.



WESTERN HEMLOCK FOREST NEAR KETCHIKAN. TREES RANGE IN DIAMETER FROM 12 TO 24 INCHES, AND IN HEIGHT FROM 75 TO 100 FEET.

fice Department, and \$732,643.28 spent by the Department of Justice.

"Although a statement of the receipts and expenditures," says the Secretary, "show a large discrepancy on the debit side of the ledger, this is by no means discouraging. There are many items of governmental expenditure in the territory that are not fairly chargeable to Alaska. Probably one-half or more of the present and past expenditures come under this head. The deficiency remaining is one that may easily be overcome. Alaska can be made self-supporting within a very few years, as soon as conditions are created which will enable settlement and development, and produce revenues. So far, the government has done little, aside from the care of the seal herd, to bring returns. It is unreasonable to expect revenue from an undeveloped and unsettled country."

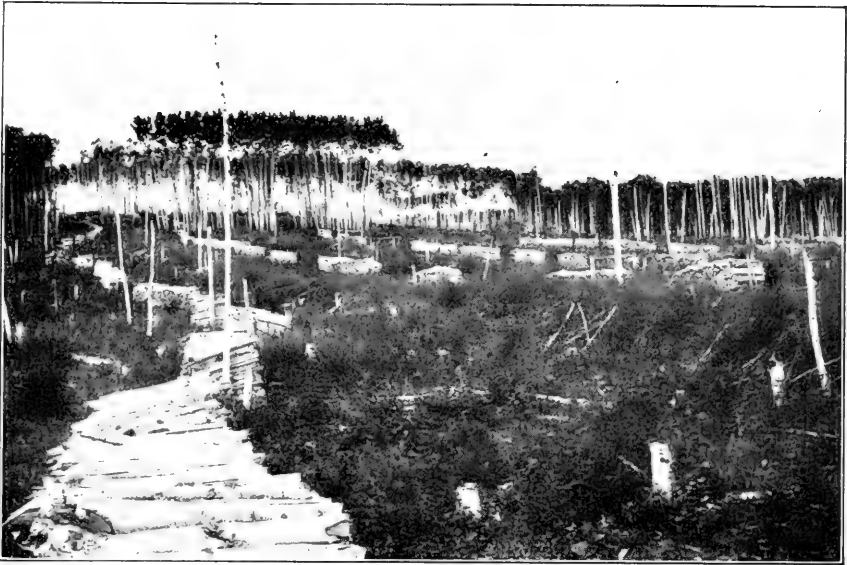
ALASKA'S FORESTS

Having quoted Secretary Lane to some extent, it is now interesting to consider what the timber lands of Alaska, which are to be made available by the building of the government railroad and two or three privately owned lines, offer to the prospective settler, or

to the lumberman looking for an investment.

In such a great area as that of Alaska it is natural there should be a considerable forest wealth, particularly since the Alaskan panhandle contains an extension of those forests which have given to our northwest and to British Columbia the deserved reputation of having the densest timber stands ever known. In comparative areas, however, the forests are rather restricted. West of Cook's Inlet and the eastern end of Kadiak Island there is no forest growth whatever, if one excepts a little group of spruce planted by priests of the Russian Greek Church near Unalaska—a group that has not thrived and stands very lonesome and forlorn, all of 600 miles away from its nearest relatives.

The two principal forest regions are, first, the south and southeast coast; and second, the broad valleys of the interior, where the only forests of any great density are pretty close to the rivers—the upper reaches of the Yukon and its branches, and the Kuskokwim. The coast forests, as already stated, are simply northern extensions of those of British Columbia. They do not go far inland, being barred by glaciers and peaks above timber line. The inland forests



CORD WOOD CUTTING IN WHITE BIRCH FOREST NEAR FAIRBANKS. CLUMP OF UNCUT ASPEN IN THE BACKGROUND.

are extensions of the interior Canadian forests, containing much the same species. In the Susitna and Copper river basins there is a sort of intermediate type between coast and interior, because these rivers have their rise well inland and break through the mountain barrier to the coast. The Yukon, of course,

flowing through tundra for its last hundred miles or so, has no valley forests near its mouth.

All in all, not much more than one-fourth of the total land area bears woodland or forest of any sort, and not more than one-twentieth has sizable saw timber, the rest of the wooded area



UPPER LIMIT OF FOREST ON NORTH SLOPE AT THE HEAD OF CLEARY CREEK. SMALL BLACK SPRUCE WITH A MAXIMUM HEIGHT OF 20 FEET. ELEVATION 2,300 FEET.



TYPICAL FOREST ON THE YUKON FLATS ABOUT 20 MILES BELOW FORT YUKON ON THE ARCTIC CIRCLE. TIMBER CHIEFLY WHITE SPRUCE, 2 TO 8 INCHES IN DIAMETER AND UP TO 50 FEET IN HEIGHT; SOME BALSAM POPLAR AND LARGE WILLOW.

bearing small and scattered stuff, usable chiefly as fuel.

Nearly all of the coast forests are included in the Chugach and Tongass National Forests. On these two forests the most common species is western hemlock, followed by Sitka spruce. Western red cedar and yellow cedar are

important and valuable though not nearly as abundant as the hemlock and spruce. There are a number of other species, but they have no commercial value or significance at this time. All of this coast timber hugs the shore line, and since the mountain rises abruptly



COMPLETE DESTRUCTION OF FOREST BY CUTTING AND FIRE NEAR FAIRBANKS.



FISH AND WOOD CAMP ON THE TANANA RIVER NEAR TOLOVANA. WHITE SPRUCE AND WHITE BIRCH CORD WOOD FOR RIVER STEAMERS HAS BEEN CUT FROM THIS FOREST; BALSAM POPLAR AND ASPEN LEFT STANDING. FISH WHEEL FOR CATCHING SALMON AT THE RIGHT.

from tide water, the timber belt is in many places quite narrow.

The forests of the interior are not nearly so dense or so productive as those of the coast, and produce comparatively little saw timber. The principal species are white spruce, white birch, balsam poplar, or balm of Gilead, various other poplars, such as black cottonwood and aspen, and black spruce and tamarack. In these interior stands the hardwoods are much more in evidence and relatively more important than in the coast forests where the broadleaves play a very small part.

A very striking difference between the two regions is in their relative forest fire damage. The damp coastal region, with fogs and an annual rainfall in the neighborhood of one hundred inches, has little to fear from forest fires; the interior, on the other hand, has suffered severely and will continue to do so unless effective measures are taken to stop conflagrations which are all too common.

Most of the timber cut in the interior is used for fuel, and the best of the lumber would not grade very high in the States. Wood here is the one source of light, heat, and power. Transporta-

tion, both by rail and river, depends upon it for steam. Fairbanks uses for firewood about 7 cords per person a year, and its population is in the neighborhood of 3,000.

The foregoing facts present, in brief, a few broad generalizations about Alaska's forest resources. As with all of the Alaskan natural wealth there are many problems connected with proper development. A large part of the problem is to retain the timber resources in the hands of those who will not wantonly misuse them.

Not so very long ago it seemed that the timber on the Alaska forests could not readily be used. Without railroad facilities the coast forests were of little value to the interior regions, and they seemed entirely too far away from the market of the outside world, but the whole situation is changed now that a government-owned railroad is an assured fact and its possible courses are already mapped out. Also with the opening of the Panama Canal and consequent cheaper rates of transportation to the east coast, there is created a demand for Alaskan pulp to augment the decreasing supply from the spruce forests of our northeastern and Lake States.



RAFT OF SITKA SPRUCE LOGS ON BEACH NEAR WRANGELL. AVERAGE DIAMETER AT THE BUTT 37 INCHES, AT THE TOP 21 INCHES. AVERAGE LENGTH, 78 FEET. CONTENTS OF RAFT APPROXIMATELY 190,000 BOARD FEET, SCRIBNER SCALE.

CONSERVATIONISTS AROUSED.

Coincident with these two great developments there came a plan to abolish the Chugach National Forest, and a bill to bring about that result was favorably reported to the Senate in May. Friends of conservation see in this the

first attack in a campaign to secure for private exploitation the great wealth of the coast timber, practically all of which is in the two National Forests. The Chugach was aimed at first because it seemed the most vulnerable, and the statement was made, in Congress and



RAFT OF SITKA SPRUCE LOGS WITH GENERAL VIEW OF SHORE FOREST AFTER CUTTING OF RAFT. STANDING TIMBER CONSISTS OF SITKA SPRUCE, WESTERN RED CEDAR, AND WESTERN HEMLOCK



MIXED WHITE BIRCH AND ASPEN FOREST ON SANDY SLOPE SOUTH OF EAGLE. TIMBER 2 TO 6 INCHES IN DIAMETER, 20 TO 35 FEET IN HEIGHT. BUILDINGS AT PORT EGBERT, AND EAGLE MOUNTAIN IN THE BACKGROUND.

out, that it had no timber whatsoever, whereas it actually contains at least eight billion board feet of choice hemlock and spruce. There was some color to the charge that areas in the Chugach were timberless, because there is a considerable portion above timber line. The Secretary of Agriculture long since decided to have this non-timbered area eliminated from the Forest. It is said that the Department of the Interior would have these treeless tracts back in the public domain before this except that it did not wish to act on the recommendations of the Department of Agriculture until after the route of the proposed Alaska railroad had been settled. It is understood that the eliminations of non-forested areas will be made soon.

It is evident also that the conservation forces of the country are now pretty well satisfied that the attack will fail, gaining their assurance from a significant vote in the Senate while the agricultural appropriation bill was under debate. An amendment to this bill was proposed, which would cut out the appropriation for the maintenance of the Chugach. For a time the debate seemed all one way, led by the same Senator who had introduced the special

bill to abolish the forest. Friends of conservation in the Senate came to the rescue, however, and the amendment was overwhelmingly defeated when it came to the test of a vote. On the basis of that vote, it now seems unlikely that the bill to abolish the Chugach has much chance to pass.

USES FOR THE TIMBER

The Government's Alaskan railroad will in itself use much timber in construction work, and there will follow a permanent demand for lumber in building up the country as its development follows railroad facilities. Mining operators will require large quantities of material both for timbers and for fuel. As the interior of the country is developed and railroad connection is made with the coast, that section will look to tidewater for all of its wood except that needed for fuel, which can be supplied locally.

At the present time there are now within or near these two National Forests, the Tongass and the Chugach, 35 sawmills of various capacities ranging from 4,000 to 40,000 board feet a day, and with a total annual capacity of something like 40 million feet. The cut



VIEW ACROSS YUKON VALLEY TO TOWN OF RAMPART AND HILLS BEYOND, FROM U. S. AGRICULTURAL EXPERIMENT STATION. TIMBER MOSTLY CLEARED AND CUT. BLACK SPRUCE AT THE EDGE OF RIVER, WITH OCCASIONAL VETERAN WHITE SPRUCE.

is used largely for local demands, with a good share going into boxes to carry the salmon pack. It is, however, not more than one-twentieth of what can be cut from the forests for an indefinite period, since they are largely over-mature and will readily stand a yearly drain of 800 million feet.

Within the past year the first full cargo of timber from the Alaskan Forests went to the States, when the steamer *Melville Dollar* cleared for San Francisco with 1,200,000 feet aboard. She was loaded at the mill, and this illustrates a phase of Alaskan lumbering which is bound to have a potent effect on the development of the industry. Many of the trees can be actually felled into the fiord-like waters of the coast; few trees are any considerable distance away and the ground slopes rapidly down to the sea. Mills on tidewater can have their logs rafted right up to the saw, and can load from their lumber piles to the decks of ocean-going vessels.

When it comes to a question of pulp, for which much of the spruce is particularly suited, there is, moreover, the added advantage of the many streams which will furnish abundant and cheap

power. It is true that they are comparatively short and have little or no natural storage basins; but they are swift, and, because of the heavy and well-distributed rainfall, constant in their flow.

The Tongass Forest, with its 70 billion feet of timber, or about one-eighth of the total stand of all National Forest timber, is already more than self-supporting, and also more than takes care of the expense of the Chugach, which thus far has not been as fully developed as the more accessible Tongass.

Any prediction as to the possibilities of the future are reasonably sure to fall short of what is likely to happen within a few decades. Five years ago it was recognized that trunk lines of railroad would accelerate development and bring about permanent population and institutions. Now the railroad is assured under the best sort of ownership.

Heretofore the idea has been to take out of Alaska what wealth might be had quickly and cheaply. That day has already passed. Placer mining under the old methods is already over. The new way is with giant dredges working carefully over the low-grade ground on long-

time operations. Agriculture is already successful in the Tanana Valley, and in the long run there will be a permanent farming population there, possibly within two decades.

Everything points to the need of holding on to the Federal Forests, and to the further need of securing such forests in the interior, though the task of administration is difficult and expensive because of the great fire danger. Now the development of Alaska is to be assured on right lines. The coal leasing bill now being considered will mean further development of the territory in the right way.

Those who have the best interests of the territory at heart will wish to see the Government program go through, as to railroads, forests, coal, and other resources. It already begins to look as if in our newest land we will put into effect a wise system of public ownership or control, and that the nation has learned a lesson from the profligacy which marked the disposal of most of the resources of our great West. Who can say that Alaska's development will not mark the wisest use the nation has yet made of the people's resources.

THE WORLD'S OLDEST TREE

WHAT is, with good reason, claimed to be the oldest tree in the world may now be seen at Los Angeles, Cal., having recently been unearthed from the fossil beds at Rancho La Brea, California, together with bones of the sabre toothed tiger, the giant ground sloth, the dirus wolf, and other animals of the distant Tertiary period. How old the tree is scientists can but estimate, but there is little doubt that it is fully one hundred thousand years since it was buried and preserved in so wondrous a fashion that it is in existence today.

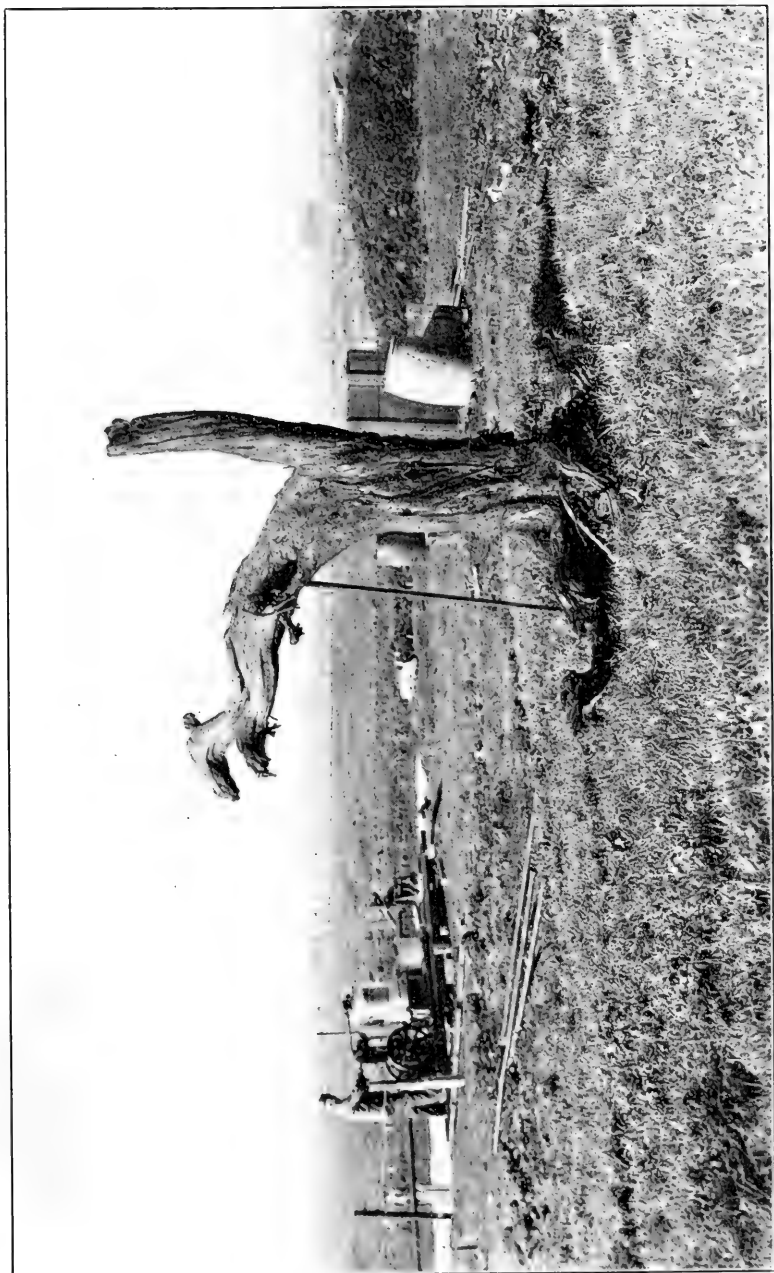
The tree was found by men working in the pits under the direction of Prof. Frank S. Daggett, director of the Museum of History, Science and Art, at Exposition Park, Los Angeles. Prof. Daggett in the *California Outlook* describes the excavations and the discovery of the tree. He says:

"As the different pits were opened and bones exposed to view, interest left the field as a whole and centered on these little spots. As unusual finds began to show up these pits began to be designated by some descriptive name. For instance, Pit 3 soon became known as the 'Tree Pit' owing to the discovery of a fine specimen of tree in it. This find

soon became well known and was watched by scores of local scientists with great interest. It was an education, or otherwise, to listen to the learned discussions carried on as the men slowly exposed the tree from day to day by the removal of the surrounding asphalt packed bones.

About three feet from the surface a strata of fossil bones was encountered. Owing to several gas vents water had been admitted to the mass and the bones were too soft to be saved. Beneath this layer, after passing through a couple of feet of clay, the men came upon a more or less worm-eaten stub. As the bones were removed from the bottom of the pit more of the tree was constantly exposed. One day a magnificent skull of a mastodon was taken out, followed by that of a camel. Sabre-toothed tigers and wolves came with such frequency as to cause no comment. Not so, however, when a skull of a lion of the African type, of monstrous size, came to view. This was found crowded closely beneath a big fork of the tree.

"Now we began to feel sure that this 'tree' was no drifting log end up in a vent. Great caution was taken to save and note every detail which might have a bearing on its occurrence. Fragments



THE WORLD'S OLDEST TREE.

THIS TREE IT IS ESTIMATED BY SCIENTISTS IS OVER 100,000 YEARS OLD. IT WAS FOUND WELL PRESERVED, WITH FOSSILS OF THE SABRE TOOTHED TIGER, THE DIRUS WOLF, AND OTHER ANIMALS OF THE TERTIARY PERIOD, IN THE NOW FAMOUS FOSSIL BEDS AT RANCHO LA BREA, CALIFORNIA, AND THE PICTURE OF IT IS BY COURTESY OF THE CALIFORNIA OUTLOOK, HEREWITH REPRODUCED.

of bark were saved; masses of leaves and twigs matted in the asphalt were examined with microscopic eyes to see if they were mere drift, or the stomach contents of herbivorous animals. Bushels of loose material were washed in gasoline through sieves for seeds, insects and the thousand and one minute forms otherwise lost. This work is usually delegated to one man, who for the time being does nothing else, for it is found that after working on a skull (the mastodon, for instance), that takes four men to lift, one was apt to overlook a specimen as small as the scapula, for instance, of a shrew, the size of a pin head, especially if hidden in a clod of la brea the size of one's fist.

"At fifteen feet a network of large roots was encountered intermingled with skulls and bones of bison, camel, tiger, wolf and sloth. Working around to the north, the roots were found firmly imbedded in a bank of oil-soaked clay, proving that the tree had grown where found. All sorts of conjectures have been made, some wise and some otherwise. Out of it all we may conclude that the tree once grew on the bank of a small run or depression, the roots on one side firmly imbedded in the bank. On the other side they extended into a soft, perhaps muddy basin. The ever shifting gas, under heavy pressure, in its effort to reach the surface, probably followed the root of the tree as the point of least resistance. Once at the surface the asphalt deposit commenced and the trap began its work, slowly, over hundreds of years of time, until the tree was completely covered as the surrounding country gradually filled.

"One wonders why the tree did not

decay and fall before these long years elapsed. We know that all its smaller branches and limbs did decay, as the worm-drilled ends attest, leaving only the ponderous trunk, 18 inches in diameter, and one main fork. There seems to be only one probable solution of the question. Certainly the tree must have been killed soon after the oil penetrated its root area, and it seems almost as certain that as the sap left the tree it was replaced by the penetrating asphalt-laden oil, the wonderful preservative of Rancho La Brea. That it did its work well is certain for the wood is sound enough to make into furniture today. An authenticated sample of the tree was sent to the Biological Survey at Washington for analysis, and microscopic slides were made of transverse and cross sections, showing that the tree was a cypress (*Cupressus macnabiana*). Many fragments of wood have been thrown out of the pits and visitors have carried pieces away. In some instances these have been sent out as fragments from the tree, with the result that the tree has already had three scientific names attached to it. The name *Cupressus macnabiana*, however, must stand for the present, as it is based on a true sample of the tree."

(The specimen of wood from the tree was sent to H. W. Henshaw, chief of the Biological Survey at Washington, D. C., to determine its identity. Dr. Albert Mann, of the Bureau of Plant Industry, made a few slides, and the tree was determined by Mr. C. D. Mell, of the Forest Service, to be a cypress, technically, *Cupressus Macnabiana*, Murr., a species which is still present in California.—EDITOR.)

Pennsylvania's Two Arbor Days.

The State of Pennsylvania celebrates two arbor days each year—one for spring planting and one for the fall—in April and October, respectively.

A CITY'S TREE WORK

WHAT a city or a town may do in caring for its shade trees, in fighting such destructive pests as the brown tail moth and the gypsy moth and the elm leaf beetle in developing municipal forests in its parks and wood lots is indicated by the successful efforts of Fitchburg, Mass., where the work of the Board of Park Commissioners, in these efforts, has been particularly successful. The report of the work done by the commission during last year has been issued and it tells in detail what was done.

Wm. W. Colton, who had charge of the fight against the gypsy and the brown tail moth, tells how the campaign was waged and his plan of operations may be found of service by a number of other New England municipalities afflicted with the pests. Regarding the attack on the gypsy moth, he says:

THE GYPSY MOTH

"In the annual fall cleaning of egg clusters, no attempt was made to keep track of the number of nests found, there being such an increase over previous years. The infestation has spread to such an extent that nearly every property in the city has more or less of them. Very few are exempt. While last winter's scout showed an increase in the number of nests, the work done up to December 1 shows that, while the general distribution has not decreased any, in fact has increased in woodlands, the number of nests found has decreased by at least one-third. This is due in part to the work carried on during the spring and summer in cleaning all badly infested places, of old trees, closing cavities in the remaining ones, and removing other hiding places. Another reason for the decrease is due to the increasing amount of spraying carried on during the spring and summer, both by this department and private parties.

"One more item enters into this cause of the decrease also, that is, the introduction of several parasites. Several colonies of one species were introduced and others have made their appearance here from colonies introduced east of us. These little fellows have made themselves apparent in numerous places, so much so that, in one or two cases the Gypsies have been



OLD METHOD OF SPRAYING FOR GYPSY AND BROWN-TAIL MOTHS AT FITCHBURG, MASS.

almost entirely wiped out. Let us hope that the good work will continue as in these friends we have our greatest hopes of controlling the Gypsies of the forests.

"It would seem from results the past year and from reports from the State Office, of work in various sections of the State, that the problem of controlling the gypsy moth was solved, in so far as it applies to the residential sections of towns and cities. This has been effected by cleaning out superfluous and useless trees and caring for the remaining good ones by spraying and treating the nests.

"The woodland problem is yet to be

solved. While we have a decrease in the number of nests found in residential sections, we find they have spread to the forests in nearly every section of the city. This can best be combated by applying modern forestry methods to the care of woodlands. By judicious thinnings, *i. e.*, removing such trees as are food for moths and leaving only the most resistant species the moths will soon be removed from the list of dangerous pests if not exterminated altogether.

"A list of trees that should be removed and one of those that should be retained is appended. This list applies only to forests and not to orchards or shade trees. In both lists first choice is given at the top of the column. The bottom of both columns are interchangeable according to conditions of woodland.

"To be Removed—Old Fruit Trees, Red and Choke Cherries, White Oaks, Thorn Apples, Grey Birch, Willows, Witch Hazel, Alder, Hackberry, Shadbush, Hornbeam, Hop Hornbeam, Black Cherry, Poplars, Elm, Mountain Maple, Striped Maple.

"To be Left—Pines, Spruces, Hemlocks, Firs, Cedar—Juniper and Larch, Ash, Hickory, Basswood, Sugar Maple, Red Maple, Black and Yellow Birch, Tupelo and Sassafras, Beech, White Birch, Black Oaks, Chestnut, Locust.

"This list is only for the guidance of those owning woodland and wishing to do some thinning. It does not mean that all those trees in column headed 'To be left' will not be attacked by the gypsy moth, as practically all of them are food for the full-grown caterpillar. It has been found from experiment, however, that the young, newly hatched caterpillar cannot eat the leaves of most of these trees and will therefore starve to death if its 'infant food' (the leaves of the trees in other column) is removed.

"A new method of combating the brown-tail was tried. During the winter the nests were removed from the trees as usual. This has been customary for years and will probably have to be resorted to, in some instances, for some years to come. For the past two years we have been conducting an experiment on a small scale



IMPROVED METHOD OF SPRAYING FOR GYPSY AND BROWN-TAIL MOTH AT FITCHBURG, MASS.

with spraying in the fall for brown-tails. We have become so well convinced that this method is both successful and cheaper, that this summer all street and roadside trees were sprayed. At the present time I am satisfied that it has been successful and will save the city much money the coming season.

"The brown-tail caterpillar or larva hatches out about the first week in August. An illustration of the life history of the brown-tail moth is here inserted and referred to by numbers. For the first two or three weeks the young

larvæ feed in groups usually on the leaf or leaves adjacent to the one on which the eggs are laid (1). At the end of this period it begins to curl these leaves up, spinning a fine web about them which forms their winter nest (2). In this nest it then molts, or changes its skin, and grows to a larger caterpillar (3). From this time on until the leaves begin to turn and drop off it emerges during the day, feeds on nearby leaves, and returns at night to the nest which has been firmly attached to the twig or branch. When the cold weather comes they pass into a dormant state and remain so until the first warm days of spring when they wake up, come out of the nests and seek food. As there are a great many days in early spring warm enough to bring them out, before the leaves are out, the young larvæ burrow into the buds for food, thus destroying many of them before they open. As soon as the buds have really started to open our young pupæ have molted again and pass into their third stage of growth. From this time on until early June they continue to feed and grow, usually keeping the tree from leaving out. During the last stage of growth they become logy and do not feed much but crawl about looking for a place upon which to form their cocoon. This occurs about the middle or last of June and is known as pupating. From this time until early in July they remain in the pupæ or cocoon stage (4 and 5). You will see from this that from early in June very little feeding is done and the trees therefore have a chance to leaf out again. During the first week in July the cocoons open and the adult moth (6 and 7), a small white fellow with a tuft of brown hair at the extremity of its abdomen, emerges, and after a few hours, flies away. These white moths live from three to five days. At the end of the first day or two they

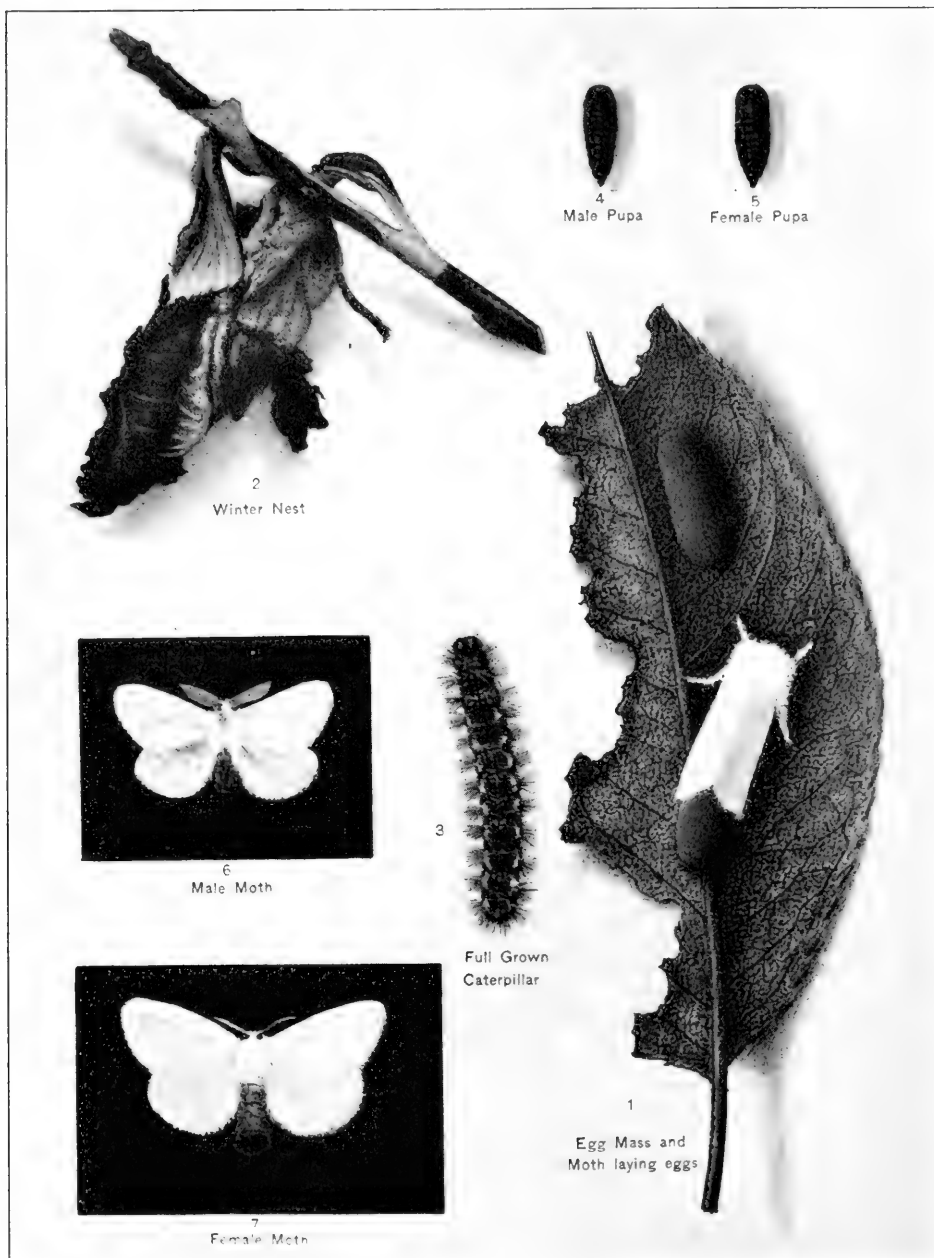
mate, after which the female lays its eggs (1) and very soon dies. These little moths fly only by night and are attracted by the lights of a town or city. This accounts for the large numbers seen just after the Fourth of July covering the electric light poles. After the moth dies the eggs remain on the leaves for a period of ten days or two weeks, when they hatch out and the



CONTROL OF ELM LEAF BEETLE ON STREET TREES. POWER SPRAYER IN OPERATION AT FITCHBURG, MASS.

young larvæ begin their work again.

"There has been much comment on the flight of the moths during July and many people believe this is the time to kill them. A number of methods have been devised and tried for doing this. Bonfires are built and thousands of moths destroyed. Men are employed to go around every morning sweeping the moths from the electric light poles and burning them. Some have turned a hose on the poles, washing them off and probably drowning many of them. A huge suction fan was constructed and



THE LIFE HISTORY OF THE BROWN-TAIL MOTH.

set up near a powerful light. The light attracting the moths, they were drawn into the fan and chewed to pieces. Another light was constructed with a mesh of fine copper wire around it highly charged with electricity, and when the moths flew against it they

were electrocuted. Another scheme tried was to construct large pans, fill them with water and place them under a powerful light. The water acting as a reflector attracted the moths by the millions, and they were drowned. All these schemes worked to some extent,



TRAINING YOUNG SHADE TREES IN THE NURSERY, COGGSHALL PARK, FITCHBURG, MASS.

but the question is, 'Do they pay?' 'Do they really do as much good as would appear on the surface?' Let us consider the question for a moment. As has been explained above, the moth lives only for a few days. One-half of these at least are males and are

harmless. The other half lay their eggs, usually within 36 hours after hatching. Most of them mate and lay their eggs very close to the place where they pass the pupæ stage. There are exceptions to this, of course, as, for instance, where a strong wind is prevailing, then



UNDER THE PROTECTION OF THE FOREST WARDEN NEAR FITCHBURG, MASS.

they may be carried many miles away before mating or laying their eggs. However, even supposing this does happen, of the moths caught and killed under any method only one-half are females bearing eggs. Of this one-half, it is easily seen that the majority have already laid their eggs. Therefore, we have expended a lot of money to kill a few thousand moths, more than 75 per cent of whom are perfectly harmless, anyway, as they have already done their damage and would die a natural death in a few days if not in a few hours. Does it pay? I do not think so.

"Now on the other hand, if the trees which you wish to preserve from them are thoroughly sprayed any time within a month or six weeks after the eggs are laid, it stands to reason that the young, tender larvæ who have got to feed for the next two or three months will easily succumb to the poison. Here you have done a maximum of damage at a minimum of cost, which, it seems to us, is the ideal way of handling this pest."

Mr. Colton makes the following recommendations:

Spraying during the summer all roadside and street trees, and also:

To do more spraying in the spring for gypsy moths;

To continue cleaning up orchard properties;

To clean up many of our back roads, removing superfluous trees and shrubs and those most likely to attract the moths;

To obtain mounted specimens of gypsy, brown-tail moths, and their parasites for educational purposes;

To put in an educational exhibition at the next Agricultural Fair and maintain the information bureau at the City Hall office.

Members of the Commission emphasize the importance of forestry work in park development as well as in the care of shade trees in the streets, as they

not only make the city more attractive but make for a healthy and more contented citizenship. The commissioners state:

"In regard to trees and shrubs—we have set out a good many at the various parks and playgrounds, and it is the intention to follow out the order adopted to plant about 500 trees on our streets and avenues the coming year.



PRODUCTS OF THE NURSERY.

"Our nursery has been and is an important addition to our department. We have a large and flourishing lot of young trees growing, and we shall be able to supply trees for the city at about one-third of the cost that we have been obliged to pay for them from time to time, as we have needed them in the past. If we are to make our city streets and avenues attractive and beautiful this work must be continued from year to year, and we hope that we shall, by you, be enabled to do so.

"In Coggs Hall Park we have planted

over 52,000 young trees, and during the coming season we shall reforest another section of the burned-over area.

"Early in the spring twenty thousand white pine seedlings, 6,000 red pine, 3,000 Norway spruce, and 3,000 Douglas fir were set out. The cost of this work, including the trees themselves, was \$200.45, or \$6.26 per M. The white pine were purchased this year by the bid, we doing our own sorting and grading. Only the best plants were used for planting in permanent locations. All the culls, amounting to something over 18,000, were lined-out in our nursery. Most of these came through the summer in good shape and can be used in the future to fill in holes in the old plantations or for more planting.

"As soon as the planting was completed a twenty-foot fire line was cut on the south boundary of the park. This, together with a number of paths and trails winding through the plantations, are expected to effectually stop any fires that may be started here, from destroying all the plantings. It will be necessary, however, each year, to clean up these lines and keep them in good working condition.

"The nursery has been enlarged by taking over two of the cultivated fields south of the old site. One was used for planting seedling evergreens, the other for large transplant trees and shrubs. The trees in the old nursery have been cultivated and cared for and show a very good growth. Many of these will have to be trans-

planted next spring in order to give them more room to develop. Several hundred more trees, of various sizes, have been contracted for and will be set out here next spring. No attempt was made to inventory the stock this fall, but next year a careful count will be taken of the stock, and the market value placed on them. In this way we will be enabled to see whether the enterprise has proven a success or not."

What Fitchburg has done and is doing in caring for its trees and encouraging



NATURE MIRROR COGGSHALL PARK, FITCHBURG, MASS.

in its citizens an appreciation of their value may readily enough be done by other cities. The first essential is the appointment of a shade tree or a park commission composed of men with knowledge of trees and having executive ability, and the second essential is to provide the commission with a sufficient appropriation.

RANGER YOUNG WILD, ON THE FIRE LINE OR LARIAT LAURA'S FATAL FORM

By E. T. ALLEN

EDITORIAL NOTE—The human interest features in the life of the Forest Ranger on the National Forests have been presented at various times in AMERICAN FORESTRY, but always in serious vein. The men who guard the nation's forest resources, however, lighten their responsibilities at times with a humor appropriate to their duties and environment. It is in order to present this spirit of burlesque that this fanciful story written six years ago is published. It does not apply now if it ever did, but represents the general conception of government bureau requirements of paper reports, which fortunately in the Forest Service are now less important than results.

IT was night, black night, in the forest. Not a leaf stirred. Not a cougar howled. No sound broke the stillness but the regular breathing of Young Wild, the Forest Ranger, who lay beside the dead embers of the fire over which he had cooked his frugal evening meal of chili and beans.

Suddenly the telephone bell rang!

Young Wild always carried a portable wireless telephone and, before turning in on this historic evening, had fixed the coherer to the top-bud of a noble sugar pine some eight hundred and fifty feet high, under which he had pitched his simple camp.

"Hello! Is this the Ranger, District Ten?"

"I am here, fear not," replied Wild.

"Death and destruction are advancing northward up the canyon of the Mokelumne in the shape of a wall of flame three miles wide," said the voice in the receiver.

"Leave all to me," said Young Wild. For Wild was a noble Ranger. He had read his Use Book and passed a searching examination along thoroughly practical lines. What had he to fear?

Just then a loud report was heard.

Wild ran for his horse.

It was gone!

"Black Heart, the Nester!" cried Wild. "I expected no less from such a miscreant."

He had no other horse. Only yesterday he had weighed the latest consignment of blank forms received from Washington for his daily reports and, finding them to weigh eleven hundred and one (1,101) pounds, he had traded

his peerless Perjured Bride, the famous pinto filly whose pink nostrils had nuzzled the posts of every saloon in his district, for a large traction engine.

The report he had just heard was the engine blowing up.

Only for a moment did Young Wild hesitate. In a bound, or less, he reached the telephone and in secret code called up the mountain lair of Lariat Laura, the Dare Devil Queen of the Sierras. Our dashing young hero and this beautiful girl had been great chums along the Sausalito water front (read "Bleeding Hearts and Order Twelve, or How Lariat Laura Broke the Gin Famine," 10 cents at all newsstands) and always stood together.

"Is that you, Laura?" he inquired breathlessly.

"No, I'm asleep," the crafty girl replied. She did not recognize him without his breath and feared some diabolical trap.

Wild made a noise like an alarm clock. Laura woke up.

"Hasten to my assistance!" Wild cried. "I am about to be devoured by * * *"

At that instant the line melted in two.

Wild entered this fact in nineteen card records and signed six duplicates of each for transmission to the Office of Operation.

But this delay saved his life.

Lariat lost no time.

Knowing the intrepid character of her dashing young lover, she was certain no ordinary danger could have caused him to appeal to a tender young female for protection. She immediate-

ly decided it was probably thirst which threatened to devour him.

Quickly completing her toilet by filing her spurs and brushing the alkali from her red velvet breeches, in these brief seconds she reviewed the situation with lightning activity of her strong and passionate mind. Although Young Wild had not told her where to look for him, she was certain he was below her in the valley.

This deduction was simple.

It was only the twenty-ninth of the month. He would barely have finished filling in his report forms for the previous month, without time to get more than one day's travel from headquarters. Throwing her keen young eye down the valley, therefore, she heard at once the crackling of the cruel flames twenty miles below. It was already too smoky to see their extent.

She realized at once that her trusty mustang would for once be useless.

For a moment this stalled her.

Then, bang! bang! bang! Twelve reports startled the echoes in the surrounding crags.

Lariat Laura had cut off a leaning sequoia by the river bank with a volley from her six-shooters.

In another moment she was balancing her graceful form on its whirling trunk as it plunged down seventeen miles of foaming rapids.

Keeping a keen lookout for log jams, which she avoided by lightly leaping over them as her precarious craft passed beneath, she soon spied Young Wild on the right hand bank reading the Use Book. As she approached, Wild threw himself on his face and sobbed bitterly.

Lariat whirled her obedient rope and noosed a stump on the bank. Then she plunged into the icy torrent and hauled herself ashore.

"Wild, dear, do not despair," she cried. "All cannot be lost!"

"It is too late, Lariat!" Wild wept. "I should have made eight more copies for Silviculture."

The golden hearted girl was on her job.

She handed Wild her jewel-mounted flask.

He returned it empty.

Dawn was breaking.

The flames were about to close around the devoted pair.

Suddenly they heard a fiendish yell of triumph from a nearby mountain top.

It was Black Heart, the Nester, exulting over his victims.

Black Heart had set the fire to insure getting his homestead claim and stolen Wild's horse so he could not go and report it.

Wild fired, but the intense heat melted the bullet and the caitiff jeered unharmed.

Wild noted this fact in his card record.

It was this simple and natural act that gave Lariat a brilliant idea.

"Wild," she cried excitedly, as she stamped her cigarette butt out with care, "where is the rest of your equipment?"

"Stacked in a big meadow just above here," he replied, "where I left it till my traction engine should arrive."

"If we spread it clear across the canyon," she urged, "in a pile 10 feet high and 12 feet wide, it will surely stay the flames until help arrives."

But at this crucial moment a telegram was handed to Young Wild, ordering him to report to Washington to become acquainted with routine.

Of course he could not delay to put out a fire, so, leaving his darling Lariat to be consumed, he started at once.

There is little more to tell. Such prompt obedience of orders from Washington, in spite of local affairs, could not fail of reward. The Assistant Chief of Operation having married an heiress and quit work, Young Wild was promoted to the place.

Unaided, her white skin scorched to a cinder, Lariat wearily piled the equipment across the canyon. When the last Form 944 was placed on the top she fell dead. As the last flame reached the pile and gave up dis-

couraged, a South African water bottle blew up and a fragment killed Black Heart in his cowardly tracks.

(Next in this series will be Young Wild's Spirit Pay-Roll, or Lariat Laura True in Death.)

DESTROY DISEASED PINES

FURTHER investigations by specialists of the U. S. Department of Agriculture into the white-pine blister rust have convinced the Department that if this disease becomes generally distributed in our forests it will be the worst enemy that the white-pine has to encounter. Drastic action is therefore urged again by the authorities in order to eradicate the disease before it becomes as firmly planted here as it is already in Europe. Owners of infected areas are strongly advised to destroy their diseased trees without delay. There is no chance that the tree can recover, and it is merely a menace to its neighbors.

To indicate the seriousness of the disease it is known about 10 years ago infected trees were found in the pines planted for ornamental purposes in a large private estate in Vermont. About 50 of the 150 trees on this estate or 33 1-3 per cent are now visibly affected by this disease. Probably 5 or 10 per cent more will develop it, for it takes a long time for the maximum of damage to be done.

In studying this menace the Department of Agriculture has had something like 200 lots of white-pines carefully inspected. Results of this inspection show conclusively that a single tree with fruiting bodies of the fungus and in proximity to a currant bush which acts

as a carrier for the disease may start an epidemic which may continue for years and may spread over an area of several square miles. Moreover, it was found that the inspection and removal of trees actually found to be infected was quite inefficient to prevent the spread of the plague. Despite the present loss that it would cause, therefore, the Department feels that the only safe method is the total destruction of infected lots.

The white-pine blister rust is a native of Europe, and was first discovered in this country in 1909. It has not as yet attacked any of our forests, and if owners of white pines which have not been grown from seeds would make a conscientious search for evidence of the disease, it is hoped that it can yet be kept under control. Ordinarily the rust makes its presence known through yellow blisters which break out through the bark on the main stem near the ground. After a few days these blisters break open and give forth large numbers of dusty orange-colored pine spores.

Owners who have reason to suspect this disease on their trees are urged to forward specimens for investigation to the Office of Forest Pathology, Bureau of Plant Industry, where examination of them will be made free of charge.

Tacoma's Water Supply.

The city of Tacoma, Washington, has entered into a cooperative agreement with the Forest Service for the protection of the source of its water supply, the watershed of the Green River, which lies within the Rainier National Forest. The two agencies working together will protect this stream from the results of forest destruction by fire or by other agencies.



A LUMBER CARRIER.
ONE OF THE FAMOUS FLEET OF THE DOLLAR COMPANY OF SAN FRANCISCO, CALIFORNIA.

LUMBER TRADE AND THE CANAL

By ROBERT DOLLAR

[In order to ascertain what may be the effect of the opening of the Panama Canal on the lumber trade of the Pacific Coast, AMERICAN FORESTRY asked Robert Dollar, of San Francisco, one of the biggest shippers of lumber, his opinion. Mr. Dollar's answer is here given. He tersely defines the attitude of the lumbermen, as he sees it, on the question of tolls, and on competition with British Columbia.—EDITOR.]

THE results of the opening of the Canal are not generally understood by the American public.

In fact, some prominent men even say that free tolls will only benefit the shipping trust. This trust that is going to use the canal is a myth and does not exist. In fact, we look for a rate-war on the start. The American public is going to pay the tolls and not the shipowner.

The cost of operating American vessels is so great there is barely a fair percentage of profit, in fact at this writing 33 per cent of all the lumber steamers on this coast are laid up, unable to run at the present low rate of freight, and no steamer engaged in the coast-wise lumber trade has paid a cent in dividends to the owners during the past nine months. Inasmuch as lumber vessels are running and barely able to pay expenses, is it reasonable to expect that they can pay the canal tolls and add this to the loss of operation? I think not;

and one thing that our learned men and theorists will find out, is that the dear American public will pay the tolls.

To illustrate: Suppose a ship is willing and able to carry freight through the canal on free tolls at, say, \$3.00 a ton, and Congress in its wisdom imposes a toll of \$3.00 a ton, no sane man would think that the shipowner would continue to carry at that rate, when the Government would make him pay \$3.00 which thereby causes the service to be performed for nothing. Strange as it may seem to some, a steamship is not operated on wind, so the inevitable result would be \$3.00 for canal tolls, \$3.00 to the shipowner and \$6.00 to the owner of the cargo instead of \$3.00.

But what is interesting the American lumberman more than anything else is this: That the British Columbia mills are permitted to use the ships of all nations to carry their lumber from British Columbia to all American ports,

whereas the American mills must employ American vessels only.

To the uninitiated, this would look all right, but it is not, for the following reasons:

First, that an American steamer costs just about double as much as a vessel built, say, in Great Britain. Then our laws and regulations compel us to carry more men than any foreign ship carries. More wages to our men, higher cost of feeding them, greater tonnage measurement and many other charges that the American vessel must pay, which are too numerous to explain in this article.

Suffice to say, that if the American

ship has to pay tolls of \$1.20, then for deck load say 40 cents per M extra, it will add about \$1.60 per M of lumber.

The foreign ship will carry lumber from British Columbia to, say, New York, for \$3.85 less than the American vessel, thereby putting our American mills completely out of the running. All this comes immediately after having put lumber on the free list.

It is a stunning blow to the lumber industry of this coast. The lumbermen demand relief of Congress by allowing them to use the same vessels as their competitors in British Columbia, thereby putting them on an equality.

PACIFIC COAST CONDITIONS

AMERICAN FORESTRY has arranged for a series of articles on western lumber conditions and problems, with the idea of presenting the practical inside viewpoint of some of the big men in the business there. These articles will include a commercial sketch of the merchantable western species of lumber, the little known ones also, and will tell of the many uses of this lumber, some new ones having been recently discovered. There will also be articles on the world's markets and the trend of trade, the possibilities of extending the trade, on the transportation from mill to market, the various features of production and the problems connected with it, the closer utilization and the uses of special products and by-products, and an analysis of the situation of private timber holders covering investment, fire protection, interest and taxes.

All these articles will be designed to give to the general public a knowledge of western forest conditions which the public does not now possess, and they will be found of decided value and much interest.

As the American Forestry Association and its magazine AMERICAN FORESTRY, in its now rapid development, finds it necessary to keep in close touch with the forestry and lumbering conditions in the chief forested regions, plans are being rapidly perfected to have its information from these various regions, of the most reliable and accurate character.

The Pacific coast region has the largest and most valuable forests in the country and Mr. E. T. Allen, of Portland, Ore., the forester of the Western Forestry and Conservation Association, has agreed to assist AMERICAN FORESTRY in presenting the articles in reference to conditions there.

Ranchers Fight Fires.

Ranchers within and adjacent to the Sierra National Forest, California, have formed a cooperative association for the prevention of forest fires. They need to use fire in clearing land for farming, and will do it on a community basis, with all members present to prevent the fires' spread.

FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER, M. F.

VI. GETTING ACQUAINTED; THE MAPLES AND BIRCHES

EVERY forest owner should know at sight his four maple and birch species. It may have been a surprise to some that so many species of oaks were to be found in almost any forest of twenty acres and over, located anywhere in the area under consideration in these articles, viz., north to the Canadian line, west to the Mississippi, south to the Gulf States and east to the Atlantic. It is no less true that at least four species of maples are common in this area with two others rather more infrequent; that one may look for at least four species of birches and the same number of hickories and ash trees, and the forest owner should not only be able to tell these trees at sight but also know their soil preferences, insect and fungus diseases, their light requirements, and uses in the arts commercially. Also one should never forget their aesthetic value as to spring and autumn coloration, and their fruit and flower display in summer. In fact, a whole chapter could be written on the tree flowers alone—and let us hope will be before this series is concluded!

THE SUGAR MAPLE.

Beginning with the four maples with an exotic fifth which cannot pass unmentioned, undoubtedly the head of the family in our country is the rock or sugar maple, easily distinguished from the others by its five-lobed pointed leaf, characteristic and not easily forgotten when once seen and identified. No other maple has it except the exotic Norway maple which has the five lobes but broadly notched and not at all like the sugar maple. The Norway has found great vogue among us as a shade and street tree, but it is in no way to be compared to our own glorious sugar

maple, as its leaves turn a dull brown in autumn (which at once lets it out of the beauty class to which all our maples belong), and its juice is acrid and worthless for "sugaring off." Its principal value in city planting is this same juice, which is exceedingly distasteful



THE SUGAR MAPLE.

to the chewers and crawlers which infest city trees, leaving the Norway maple immune from their attacks.

The sugar maple, to the writer's mind, is best in forest stands forming a veritable "sugar bush" or at salient points or else featured on your landscape along the edge of the forest; also as a shade tree in pasturage. At all these points its gorgeous autumn coloration is a pure joy to look at, and it



ROCK MAPLE AND BEECH.

thrives even with considerable tapping each year. I do not fancy it for a lawn tree principally because of the hard, strong leaf, which, after passing through the yellows and reds of the frost moon, drops to the lawn and will remain there all winter without disintegrating and must be raked off at considerable expense on a large sward.

There is a better maple for that purpose, which we will come to later.

The sugar maple is a fall seeder, the keys being set at about 90 degrees, whereas those of the Norway maple, also a fall seeder, are set in a straight line. To raise seedlings the keys should be collected in the fall and worked into a bed of rich loam, leaving them all



A VERMONT SUGAR MAPLE.



WHERE THE RED MAPLE EXCELS.

winter, when a good germination the following spring will be secured. Unless you are raising a lot of them to underplant a thicket, with the eventual formation of a sugar bush in mind, it is better to get young nursery saplings, the 8 to 10 foot size costing about 80 cents. Young maple seedling will endure any quantity of shade and can be underplanted with just a clearance of the bush about the site. In its soil requirements the sugar maple is peculiar. Almost any rich, clayey soil will grow it, if not too dry, within certain temperature limits. While its natural limits extend south to the Gulf, it thrives best in the northerly range. It is very rare in the coastal plains of the Atlantic States and cannot be grown there with much success. As in most tree-planting

operations one must let Nature be the principal guide, and if a species is conspicuous by its absence in your locality, there is usually some good reason why it is missing, and attempts to introduce it artificially are not apt to end in success. We have no sugar maples in the forest of Interlaken, though red maples are abundant, and the planted silver and Norway maples do well. Our soil

is sandy and sour though no wetter than any rich, moist loam in the clay and lime base soils to the west of us where the sugar maple thrives. It is not the sand which keeps it out, as sugar maples are famous for their growth and abundance in the Champlain sands and gravels of southern Michigan. In the writer's opinion, the absence of any lime base in our soil accounts for the non-appearance of this tree.

As to growing it in forests, as both the lumber and sugar are valuable, and neither one interferes with the quality of the other, it should be grown in standard forest of pure stand, as its European cousin is grown, so as to get tall, straight lumber, for side sunlight will surely cause low branching and ruin the lumber. A tree can be tapped for about three gallons of sap per year without injury, and the tapping should not be begun until the tree reaches twelve inches in diameter.

FAVORITE, RED MAPLE.

Next to the sugar maple stands that old favorite, the red maple, with its habit of bending caressingly over the streamside, its scarlet and purple glories

reflected in the placid water. The wind blows, and instantly there is a flutter and a flash of upward-turning red leaves, and a sheen of silver white glances over the whole tree as the lower faces of the leaves become exposed to view. Poets have loved this tree since the world began. The first to tinge the woods with red in late March, the spring zephyrs waft breaths of its

barren ridge and reds and yellows, and even pure yellows in more kindly soil.

It is almost as hard as the rock or sugar maple, has a remarkable wavy grain in old specimens and is the gun-maker's choice for a maple gunstock. Like the sugar maple, it has the peculiarity of growing knobs of sapwood over old suppressed branch scars, and to own a woodsman's drinking cup all



THE RED MAPLE.



CHESTNUT OAKS AND RED MAPLES ON THE LAKE BANK.

heavenly perfume in the warm sunlight—the odor of red maple blossoms, as sure a sign that spring has really come as the first bluebird. Along in May while the tender leaves are yet unfolded, come the great clusters of red samaras (keys) which flutter down in June and immediately sprout, giving us a thrifty forest of young seedlings wherever there is sunlight. Through the summer the red maple is a shade tree of the first class, and then in the fall, when the Great Show begins, it is in the thick of the fray, flaunting its great plumes of red along lakeside and

one has to do is to saw off one of these knobs, and, while the sapwood is still green, gouge out the interior following the contour of the sap layers and getting them out, all but the last two.

Unlike the sugar maple, which is an almost perfect firewood, the red maple makes one of those logs which can hardly be burnt. It gives a fine back-log for your fire, nevertheless, and will stand a lot of burning in front before it takes fire itself. Dry and seasoned, it burns fairly easily. It is instantly and easily distinguished from the sugar maple because its leaf is virtually

three-lobed, the two lower lobes, so prominent in the sugar maple, being aborted and absorbed into the contour of the leaf base, and in addition the entire periphery of the leaf is notched while that of the sugar maple is smooth.

The red maple grows all over the area considered in these articles, and while it will do well in swampy localities where the other maples cannot



THE MOOSEWOOD OR STRIPED MAPLE.

exist, it is glad to get a moist, not too swampy, soil to grow on. In such locations its autumn leaves will be yellow and the trunk yield a good lumber, while in wet or extra-dry soils its leaves turn a uniform deep red and the trunk persists in growing crooked and branching, the phenomenon of the red leaves seeming to be due to the insufficient root nourishment of both swampy and barren soils. The seedlings endure shade well but later the tree *must* have sunlight, which it usually manages to get by running up a ridiculously slender sapling twenty feet high and two inches in diameter! Seedlings transplant easily, and 8-foot nursery saplings

cost about 75 cents each. As its lumber is poor, cordwood value low, and syrup thin and scanty, the red maple should not be encouraged except for aesthetic considerations and in swampy spots where it is the only maple that will grow.

THE SILVER MAPLE.

The silver or soft maple is familiar



THE GRAY BIRCH. A VERY FEW OF THEM WILL TONE UP ANY THICKET.

to us all because it has long been a favorite street tree owing to the fact that its foliage crisps up and disappears very soon after falling. You will recognize it by its feathery, five-lobed leaf, silvery underneath and turning yellow in autumn before falling. Its yellow flowers are out as soon as those of the red maple and



A FAVORITE HAUNT OF THE BLACK BIRCH.

the keys ripen and come down in early June—the streets are covered with them along about Commencement time. In the West this tree is extensively cut and sold for the same grade lumber work for which we use hemlock and “Carolina” pine in the East—sheathing, underflooring, scaffolding, etc., but in the Middle Atlantic States the silver maple is not at all common, growing wild, and you may not encounter more than one or two specimens in your forest. It is preeminently the maple for lawns and the border of driveways, as its leaves are very easily handled, burning easily or else disintegrating on the sod during the winter. Except for such purposes and for an occasional touch of yellow on a forest hillside, this maple is hardly to be encouraged. It will grow on almost any soil not too swampy but cannot endure shade, and should be planted where it can get at least 10 to 4 o’clock sun.

THE BLACK MAPLE.

Setting aside the mountain maple and the black variety of the sugar maple,

the most plentiful member of the family growing wild is the moosewood or striped maple. A large, coarse leaf with rounded base, somewhat resembling the red maple but never to be taken for it, for the moosewood is usually a large bush, and all its smaller branches are dark-green with characteristic white stripes. Any New England country boy can tell you all about it, for he makes his whistles of it. The keys are pretty, hanging in long, drooping pendants in pairs, ripening in August. The tree prefers the moist hillsides and banks of lakes, and if Nature grows it at all it will occur in such profusion as to require discouragement rather than encouragement. Although it occurs in cool, mountain brook ravines as far south as Georgia, I doubt if it would thrive if grown in hardwood forests much south of northern Connecticut. On the whole, a rather handsome little maple with its immense sap-green leaves, turning bright yellow in Autumn, but hardly important enough to require especial effort in its introduction. Useful to campers because a tea of its



ADIRONDACK YELLOW BIRCHES GROWING IN COMPANY WITH RED SPRUCE AND BALSAM FIR.

leaves makes a good physic when no standard medicines are available.

THE BLACK BIRCH

The family of the birches is one so important and its members occur so abundantly in all forest estates that more than a bowing acquaintance with the different species is advisable. Probably the most universal of all of them is the black birch, a handsome, feathery tree that becomes a plume of pure orange yellow in Autumn. Sand, clay, granite and limestone soil bases seem to suit it equally well, so long as the soil is reasonably moist, and its range is the whole of our area. To my mind advantage should be taken of this tree's tendency to form a perfect crown under fair sunlight conditions, as no more handsome or graceful forest citizen grows than this same black birch. This is due to the almost mathematically regular forking of the end twigs of the year's growth so that its age can be told with reasonable accuracy by counting the forks on a large branch back from the tip with due correction for

the time of its appearance on the trunk (usually, in a large branch, early in the tree's life). Wherefore, clear away conflicting trees when making a thinning and give it a chance. It is always at its best when framed in a brook vista or festooning lovingly over the quiet shores of your lake.

Its fruit is a small catkin and flower insignificant, best collected when ripe in the fall and sifted for seeds, as the forest seedlings of birch are almost impossible to transplant and the nursery saplings difficult to make succeed. Sow in spots where wanted and snip all but the most successful seedling when they come up.

THE YELLOW BIRCH

The yellow birch is one of the great hardwoods of the North, being lumbered extensively in the Adirondacks. It is apt to make rather a crooked, ugly tree, and its ragged bark adds not at all to its beauty. It does not get on in the Middle States, where the winters are comparatively mild. It transplants rather more easily than the black birch

and is said to make a handsome tree when grown in good sunlight without much competition. As it never can have the handsome, glossy cherry-like bark of the black birch, there is little reason for preferring it to the latter, more especially as it requires a quite wet soil and cannot stand long, hot summers.

CANOE OR WHITE BIRCH

Undoubtedly the most historic of our birches is the canoe or white birch, the tree which opened up this continent to civilization, for the canoes of its bark gave the voyageur and frontiersmen their only means of wilderness travel until the ice formed on the waterways. It is an exceedingly handsome tree, pure white in its bark, not to be confounded with the eastern gray birch, which has black triangles on the bark under each branch joint with the main trunk. Grows in gravelly or granite base soils not too wet; cannot stand the hot summers of localities south of the Massachusetts line except in mountainous districts such as eastern Pennsylvania, where the altitude gives needful coolness.

THE GRAY BIRCH

The gray birch is perhaps the most popular of our native birches for forest estate landscape gardening. Nearly as white as the canoe birch, when young it will deceive you mightily as it hardly shows a sign of white anywhere and is only identified by its characteristic notched birch leaf with a very long point on the leaf. Easily confounded with the poplar when young, but the

greenish bark of the latter is its sure identification whereas the young gray birch twigs are brown. The bark will not peel easily nor separate into layers like its cousin the canoe birch, and underneath the inner bark is dark green. Will grow anywhere, wet or dry soils; sand, clay, limestone or granite base, and can be introduced anywhere in our area, in spite of the fact that its distribution is entirely along our Atlantic seaboard. This fact is, I believe, due to the gray birch being a wing seeder so that the prevailing westerly breezes in the fall when its seeds come ripe have made its westward progress exceedingly difficult. That and the fact that it cannot endure shade and is easily suppressed by trees with larger and heavier leaves. If properly managed both as to planting and clearing out thickets with the axe, a great deal can be done in an ornamental way with the gray birch. Leaves turn yellow in the fall.

All the birches are excellent firewoods, furnishing their own gas from the birch oil, and there is no prettier sight than a log of yellow or black birch in an open fire, its tiny, yellow jets of flame blowing out at every pore. As the timber has a big commercial value in furniture work, a northern owner with a big hardwood stand of yellow birch has a valuable asset. Where the soil is favorable and black birch is already abundant, it would be well for a Middle-State owner to encourage a stand of black birch by natural seeding and judicious clearance with the axe.

(TO BE CONTINUED.)



BALSAM FIR FOR PULP

BALSAM fir, a tree which a few years ago was considered of little value, is now in demand for pulp wood. This demand has been brought about, says the Department of Agriculture, by the

cylinder faces upon which the pulp is rolled out. Balsam fir does not have a resinous wood, and the material which gums up the cylinder probably comes from grinding balsam under conditions adapted to spruce wood. Yet from ten



CONE LOADER BALSAM FIR.

NOTE THE NUMBER OF CONES ON THIS TREE. IT IS AT SANTA CLARA, FRANKLIN COUNTY, NEW YORK.

enormous expansion of the pulp industry during the past two decades, with its present consumption of three and a quarter million cords of coniferous wood and the consequent rise in the price of spruce, the wood most in demand for paper making. In addition, the department goes on to say, balsam has begun to take the place of spruce for rough lumber, laths, and the like, as the price of the latter wood has risen.

The chief objection to the use of large amounts of balsam fir in the ground-pulp process of paper making is said to be due to the so-called pitch in the wood, which injures the felts and



Photo. by the American Museum of Natural History and Mr. Ernest Keller.

A BALSAM FIR.

THIS IS A FINE SAMPLE OF THE BALSAM FIR. THE TREE IS IN THE OPEN NEAR GOLDEN BEACH, ADIRONDACK MOUNTAINS, N. Y.

to twenty-five per cent, and possibly more, of balsam can be used in ground

pulp without lowering the grade of the paper produced. It is known that with balsam logs left lying in water over a

season this drawback practically disappears.

In chemical pulp, produced through the action of acids, these acids are known to dissolve the pitch, and any amount of balsam can be used, though some claim that too much balsam in the pulp gives a paper that lacks strength, snap, and character.

At the present time, balsam fir furnishes about six or seven per cent of the domestic coniferous wood used by the country's pulp industry. The tree itself constitutes, numerically, about twenty per cent of the coniferous forest in northern New York and Maine, and is abundant in many parts of New Hampshire, Vermont, and in the swamps of northern Michigan, northern Wisconsin, and Minnesota. It readily reforests cut-over areas, and attains a size suitable for pulp wood in a short time.

Under present methods of cutting, balsam fir is said to be increasing in our second-growth forests at the expense of red spruce, and with the gradual decline in the supply of the latter wood the fir will become more and more important commercially.



BALSAM FIR.

ABOUT THIRTY YEARS OLD, 30 FEET HIGH, 7 INCHES DIAMETER.

AN ACKNOWLEDGMENT

EDITOR AMERICAN FORESTRY:
Dear Sir:

On page 382, AMERICAN FORESTRY for May, you most kindly gave editorial notice of a meeting at Harrisburg club rooms on May 4, when a loving cup and other evidences of most friendly interest were presented to me.

May I place myself further in your debt by making in AMERICAN FORESTRY acknowledgment to the friends who were present at that meeting, and to those who could not be there, of my

profound gratitude for their appreciation of what I have tried for thirty-seven years to do for the forests and associated interests of the country.

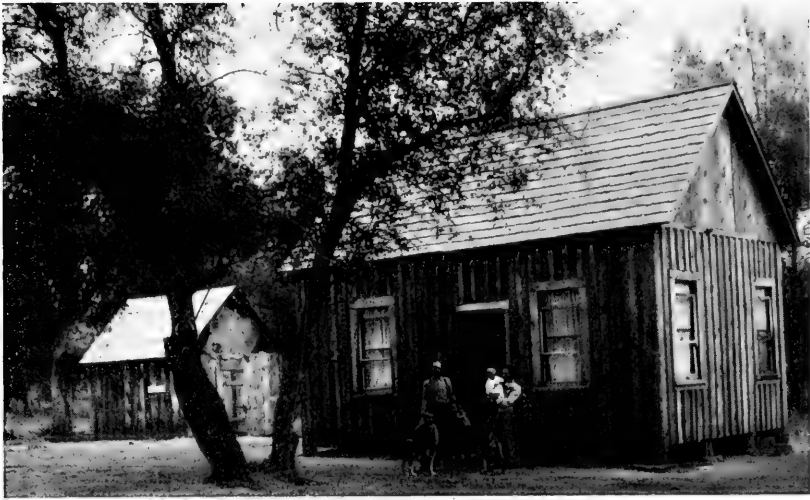
It is not given to every public servant to receive such recognition, nor has any one a right to expect it; but when it is given, it should be thankfully received and kept perpetually in memory as "a crown of rejoicing" and as a stimulus to renewed and more productive effort.

Gratefully yours,

J. T. ROTHROCK.

Controlling Sand Dunes.

The forest service has been requested to cooperate with the port authorities of Coos Bay, Washington, in planting to control shifting sand dunes.



A HOME ON THE NATIONAL FOREST.

THIS IS THE RESIDENCE, WHICH HE OWNS, OF A SMALL USER OF THE SIERRA NATIONAL FOREST.

FOREST SERVICE AND PUBLIC

By PAUL G. REDINGTON

Supervisor Sierra National Forest, California

IT stands to reason that the administration of the Forest Service will be judged with favor by the users of the National Forests and the public generally, if fairmindedness, tact and a desire to meet the users more than half way preponderate in the make-up of the average Forest officer. That these qualities have in the main governed the attitude of Forest officers in the past nine years is patent from the changed reception which the policies of the Forest Service are now accorded by the vast majority of people who do business on the National Forests. At first there was distrust and a feeling that unnecessary paternalism was being foisted upon a people who heretofore had been perfectly well able to handle their affairs without advice from any official. There were men, also, who appreciated that regulation and supervision of the timber cutting and grazing and the disposal of lands meant to them a decreased revenue, at least for a few years. The antagonistic attitude of such men could with difficulty be changed to

a friendly one, even by the exercise of fair play. This class of opponents to the Forest policy was, however, in the minority, and it was up to the Forest officers to concentrate rather on the disgruntled majority or those people who were suspicious of the intent of the Government and skeptical of the success of any administration of the forested areas.

It has been most interesting to note the various transition stages of sentiment of the users toward the Service and its men. The originally hostile position was changed slowly to one of more or less indifferent acquiescence, as it became apparent that the Forest administration had come to stay. As one user was heard to say, years ago, "These rangers think they can run things—let 'em go to it." This attitude of aloofness was presently superseded by one of hope when it developed that the local users and the small men were constantly getting the square deal which had been promised; and when, for instance, it was brought home to the



THE CRANE VALLEY RESERVOIR OF THE SAN JOAQUIN LIGHT AND POWER CORPORATION, A LARGE USER OF THE SIERRA NATIONAL FOREST.

cattlemen that supervised grazing did not necessarily mean decreased returns. The feeling of hope was displaced, finally, with one which had as its chief element the desire to cooperate with Forest officers, and this feeling is the one which is now so widespread as to cause the knocker and the backbiter to stand out as a distinct exception.

This remarkable change on the part of thousands of people of the West could never have taken place had not the Forest officer been honest, unwaveringly faithful to the cause of which he was the representative, friendly with his neighbors and filled with a desire to win out against big odds by a tactful, industrious and common-sense campaign. That the great body of Forest officers has been imbued with ideals of courtesy, honor and industry is due very largely to the remarkable character of its leaders. A Forest officer's business is everybody's business, to a far greater degree than is true of an employe of a private corporation. This is truer now than at the inception of Forest administration, because the people have finally come to believe (and rightly) that they really have a great deal to do with the running of the National Forests. It follows that extraor-

dinary care must be used by the Forest officer to treat all impartially, to hide his personal grievances under a cloak of official friendliness, to be patient in his dealings with people who are not as well versed in Forest affairs as he is, and to avoid promises where there is any doubt of fulfillment.

There is no regular eight-hour day of labor for any permanent Forest officer, for two reasons: (1) The work varies from season to season, and during the busy period of the year (which now, incidentally, on a well-organized National Forest extends well through the year) the officer must generally be engaged from daylight to dark to finish his duties, and (2) criticism would arise if an officer refused to do business out of hours with a user who could not conveniently transact the business at another time. A Forest officer must bear this point constantly in mind, in order to close any possible opening through which criticism of lack of industry and attention to duty might creep.

A Forest officer should keep thoroughly posted on the sentiment of the people in his locality, and where adverse beliefs exist, should make it a point to get on a friendly personal basis with men who would have things otherwise,

gain their confidence, get their point of view, show them where they are mistaken, if possible, and follow up their suggestions as to change or improvement in lines of work. The frank acceptance of your opponent's idea, where it seems to be a good one, goes a long way toward convincing him that there may be some good in you after all.

The Forest officer should not fail to study out methods which, if adopted, are going to officially elevate or improve local conditions. The regulations of the Forest Service are so drawn as to be highly elastic and therefore can generally be made to fit varying local needs. However, new problems are constantly cropping up which demand another method of settlement than any specifically authorized in the manual, and it is because of this that a Forest officer should be diligent in observation and painstaking in the proper kind of inquiry.

The Forest Service has gotten close to the people of the West because it would not tolerate officiousness, impatience or incompetence in its officers and because its organization was free from that tincture of bureaucracy which is

unpalatable to any American citizen.

Now that the confidence of the people has been obtained, and the relation between officer and user worked out, and understood to a satisfactory degree, the men in the Service must make doubly sure that there shall be no retrogression. Any Forest officer has a whole lot of authority, and can work it for good or ill, depending on his viewpoint and his appreciation of the results of a move in either direction. It seems to me decidedly essential to hold what has been gained in the esteem and confidence of the people. We should not take the attitude now that we have done well and the people are satisfied, and if we do assert a little undue authority, our superior grasp of the situation and the fact that we are government officials and in control will down the still small voice of the man we hit by such tactics. Only by holding to the ideals which have been steadfastly maintained during the last decade can we hope to continue and make stronger the amicable and satisfactory relation now existing between the public and the Forest Service.

SCENIC FOREST PRESERVED

PRESIDENT WILSON has signed a bill authorizing the exchange of certain private lands in the Sierra National Forest and the Yosemite Park for National Forest lands of approximately equal value.

This is the outcome of negotiations between the Forest Service and the Madera Sugar Pine Company started in August, 1913. The objects to be effected were, from the viewpoint of the public, twofold: to preserve a strip of uncut timber along the road from Wawona to the summit of Signal Peak and by so doing maintain this popular side trip as a scenic forest drive, and to secure clear title to the United States of the timber in the watersheds

of the upper Chowchilla River, Devil's Gulch and the South Fork of the Merced. This timber is needed to round out several small logging units which eventually will be utilized in connection with the agricultural development of the foothill region adjoining.

In appraising the values of the timber, the Forest Service, after a thorough cruise and study of the logging conditions on the ground, figured the total cost per thousand feet board measure of manufacturing lumber from the standing timber in each tract. To this cost was added an equal margin for profit for each and the sum of these two, subtracted from the estimated mill-run lumber value, was taken to be the market value of the standing tim-

ber. Approximately 2,453 acres of company land will be traded for 2,468 acres of Government land. The company's land carries 119,875,000 board feet of timber worth \$433,187; the Government's, 121,757,000 board feet worth \$433,172, or an average appraised

stumpage value of \$3.62 per thousand for company timber and \$3.56 per thousand for Government timber. The valuation is affected both by the proportion of sugar and yellow pine in the stand and by the relative accessibility of the two tracts.

A LUMBERMAN'S VIEWS

JOHAN M. WOODS, of East Cambridge, Mass., chairman of the Forestry Committee of the National Hardwood Manufacturers' Association, in his report at the annual convention held at Buffalo in June makes the statement that:

"A careful scrutiny of the words and acts of the executive and legislative departments of the nation reveal but little to commend, and apparently less to encourage those who believe the forest interests of the country should be entirely divorced from partisan politics."

He then voiced the emphatic declaration that

"We believe the experiences of the past and present conditions and the needs of the future demand that this great and vital asset of the nation (the forests) shall be placed under the control and management of men of wide forest experience, absolute honesty and demonstrated business ability."

Of the improvements to be made in the cause of forestry, such improvements as the American Forestry Association is endeavoring to bring about,

Mr. Woods said:

"Intelligent leadership and the diffusion of facts and all available information will formulate and crystallize public opinion so that it will be easier to place on the State books legislation in relation to the prevention of forest fires, equitable taxation of forest lands, establishment of State, city and town forestry reservations and reasonable regulations and appropriations."

Mr. Woods sees danger of the timber supply being so rapidly depleted that the forests of the country may disappear. He says:

"It needs no prophet to foretell the future of our forest supply of merchantable timber of all kinds. Therefore it seems to be a wise thing to begin in State and nation a system of reforestation of land unsuitable for agriculture or any other purpose except the growing of timber."

Mr. Woods does not believe that present lumber trade business is due to any "psychological depression." Says he:

"Applied to the lumber business we should say that it (psychology) means a man who would see rot, knots, shakes and worms when buying lumber, but which fade away when selling it.—The end of psychological lumber dealers is in the bankruptcy court."

Ten Year Pines for Posts.

Jack pine trees planted ten years ago in the sand hills of Nebraska are now large enough to produce fence posts. Last year the first seed was gathered from this plantation.

Arboretum at Pullman.

The agricultural experiment station at Pullman, Washington, is establishing an arboretum in which it is proposed to grow a group of each of the important timber trees of the temperate zone.

\$50,000.00 Bond Issue

of the

American Forestry Association

To Members of the American Forestry Association:

It has been decided by the Board of Directors to issue bonds of the American Forestry Association to the amount of \$50,000, paying six per cent interest and redeemable within twenty years.

The money will be used to improve the magazine AMERICAN FORESTRY, put it on a more influential and better paying basis, increase the membership of the Association and extend its very important educational work.

The Association has no debts, it is sound and strong financially; the magazine, AMERICAN FORESTRY, returns a substantial profit, which is used in educational work, but the Directors realize that with money to spend for development work, the Association's value to the general public can be greatly advanced, and its membership largely increased, and at a profit to the Association.

Therefore subscriptions to the bond issue are requested from members who are interested in the development of the Association and the extension of its work. The bonds are to consist of \$45,000 (forty-five thousand dollars) in \$100 bonds and \$5,000 (five thousand dollars) in \$10 bonds. Subscriptions of only \$100 or less are desired, although larger subscriptions will of course be accepted.

Subscriptions may be made direct to the American Forestry Association, or further details will be sent upon request.

SUBSCRIPTION BLANK

AMERICAN FORESTRY ASSOCIATION,
Washington, D. C.

*I hereby subscribe for \$.....of the \$50,000 bond issue of the
American Forestry Association.*

Name

Street

City



NO PATROL—A DAMAGING FIRE.

THIS FIRE WAS IN A REGION WHERE THERE ARE NO LOOKOUT STATIONS AND IT WAS NOT DISCOVERED UNTIL IT HAD REACHED A WIDE EXTENT AND CAUSED GREAT DAMAGE.

NUMEROUS FOREST FIRES

DURING June the newspapers had reports in almost every issue of forest fires in one section of the country or the other, and a list of these reports would fill several pages of *AMERICAN FORESTRY*. It promises to be a bad fire season, the weather conditions being such that the fires start readily and spread rapidly.

Fortunately the reports to date are that no very great losses have been caused by any single fire, although the aggregate loss will reach a large sum. Also, the newspaper reports in many cases have, doubtless without any intention of doing so, exaggerated the importance of the fires, for advices have been received by the American Forestry Association that a number of them have been on brush land and through slash and that the actual damage to standing timber was comparatively small in these cases.

Nevertheless, the damage will reach a considerable figure, and these fires again emphasize the necessity for increased fire preventive measures, continual education of the public as to the need of taking infinite precautions to prevent fires, and the value of leaving

forests in which timber has been cut in such a condition that the danger of fire is reduced to a minimum. All of this is part of the work which the American Forestry Association is doing.

The losses so far this fire season would have been very much greater had it not been for the effective work of the various fire protective associations, of the Forest Service and the State Forestry departments. These with their well-organized patrol and lookout work have been able to detect numerous fires before they managed to get a good start and to fight them with forces of trained fire fighters.

So numerous have been the fires and so difficult is it to obtain accurate estimates of the losses that definite announcement of all of the damage done, the extent of the fires, and the causes cannot be made until the fire season is ended.

More than one hundred forest fires occurred during May in the national forest areas of the southern Appalachians, coincident with one of the severest spring droughts ever known in the southeast. The statements are based on reports of the weather bureau and the forest service.



A FIRE DISCOVERED.

THIS IS A VIEW OF A FIRE JUST DISCOVERED BY A PATROL STATIONED AT A LOOKOUT STATION. AS A RESULT OF THE ALARM SENT OUT BY HIM IT WAS FOUGHT AND QUENCHED BEFORE MUCH DAMAGE WAS DONE.

The rainfall throughout the greater part of the southeast during most of March, April, and May was below normal, and in certain sections of the Carolinas in May the rainfall dropped as low as two per cent of the normal. The number of fires reported in the southeastern forest areas increased during the spring months, while the drought increased. Only 26 fires were reported for March, 89 for April, and 104 for May. The latter month is usually a safe one as regards forest fires. Most of the fires occurred on the White Top, Unaka, and Smoky Mountain areas on the Carolina highland, which are crossed by railroads. Railroads are given as the cause of three-quarters of the April fires reported. Only those fires which were burning or near government land were reported by the forest service; they are, therefore, only a small portion of all the fires.

The month of June started in with the drought continuing at full blast in the southeast. A few local rains and showers have occurred, but these have not been sufficient to reduce the fire hazard.

In the far west the two bureaus of the department are cooperating to the fullest extent, the weather bureau fur-

nishing special warnings of drying winds and the forest service taking extra precautions when such warnings are received.

SPORTSMEN SHOULD HELP.

Because of the fact that many forest fires are set through the carelessness of hunters, campers, and others who go into the woods for recreation, the Forest Service has taken up with manufacturers of firearms and ammunition the question of a cooperative arrangement through which purchasers and users of guns and cartridges shall be reminded of the fire danger.

It has been pointed out that in the lumber regions of the Northwest, for example, manufacturers and other business men have been having printed or stamped on their stationery and pay checks various crisp, catchy statements about the loss which the public suffers through the decreased demand for labor and decreased money in circulation if timber, which is the source of many of the Northwest's industries, is burned up.

It has also been pointed out that in the east particularly many forest fires are started by the carelessness of hunters, who drop burning matches, cigar or cigarette stumps, or pipe coals in the woods, or perhaps build a fire which is



A COMMON SIGHT.

SUCH A VIEW OF MOUNTAIN SCENERY AS THIS IS OF NOT INFREQUENT OCCURRENCE DURING THE MUCH DREADED FIRE SEASON.

left burning when the hunter goes on. Forest fires of course greatly injure the interests of sportsmen by robbing the birds of their proper cover. They also impair the food supply of both birds and big game, through the destruction of the undergrowth which furnishes browse, berries, and other food.

The Eastern woods are exposed to the danger from fires principally in the spring and fall, when most of the trees are bare and the leaves on the ground are dry. The spring fires, many of which are due to trout fishermen, may destroy the eggs of game birds and even the young birds themselves. Since trout fishermen are likely to hunt in the fall, the same individuals, if careless, may be a source of danger at both seasons.

It is suggested that the manufacturers of arms and ammunition ought to be sufficiently interested in the matter of perpetuation of game to be willing to help in the campaign against forest fires. This help may come through the printing of some brief fire warning on cartridge boxes or some slip to go with any hunting or camping supplies which are furnished. Several manufacturers have already expressed their interest

in the matter and their willingness to help.

A REPORT FROM THE WEST.

While the early forest fires reported in May were mostly in slashings and without loss, June opened the commonly recognized fire season with indications of a dangerous year that demands more than usual precaution, according to bulletins received by the Western Forestry and Conservation Association from all States in the Pacific Northwest. Much less than the usual amount of snow remains in the mountains and in some regions there have already been several weeks of dry weather broken only by one short rain. Atmospheric conditions seem to be conducive to frequent dry interior winds, requiring extraordinary precaution in firing slashings. Patrols are already in the field and being rapidly recruited to their full strength. Unless there is rain trouble is expected, but the protective organization to meet it will be better than in any past year.

Washington had fully 100 fires in May, some of them receiving much publicity, but practically all were slashing fires more useful than otherwise. The State has county wardens on duty and is very active in educational work. The Washington Forest Fire Association

has eighty men in the field. Road builders' debris now constitutes the worst hazard.

Idaho reports an early spring, and dense vegetation make dry weather more to be feared than usual. Contrary to Washington, rights of way are in better condition than slashings, especially those of settlers and small loggers. Patrol forces are cleaning up fire-traps and working on trail and telephone systems.

Montana conditions are much like those of Idaho. There have been no important fires.

Oregon has had some small slash fires. The State forester urges continuation of purposeful slash burning, under permit and with full precaution. He has about 26 men in the field. Private patrol associations also began work in May and will have 350 men on duty by July 1.

Throughout the Northwest, cooperation between private, State and Federal forces is more complete than in past years. The Weeks law fund granted by Congress to States with efficient systems has again given Oregon, Washington, Idaho and Montana important financial assistance. Much attention is being given by all agencies to lookout stations and telephone extension. In short, all report excellent preparation to meet a bad year, but urge earnest cooperation by those who use fire in the woods. Careful handling of slashings by settlers, road crews and loggers is agreed to be the most urgent need at this stage of the season.

PUBLICITY WORK.

It may perhaps be of interest to the readers of AMERICAN FORESTRY to know what one National Forest is doing in the way of reaching the forest users in order to secure their coopera-

tion and good-will in fire-prevention work.

The Apache National Forest, embracing 1,276,400 acres, probably contains the best and the greatest number of trout streams of any Forest in Ari-



THIS PICTURE NEEDS NO TITLE.

SUCH FOREST FIRES AS THIS DO UNTOLD DAMAGE YEAR AFTER YEAR IN OUR FORESTS.

zona and New Mexico, and although located at a great distance from railroads, is visited annually by a large number of fishing and camping parties, hunters and trappers as well as transcontinental tourists over the Ocean to Ocean Highway, which crosses the forest. A considerable number of our fires are attributable to this class of users,

and it is necessary to reach this class especially, as well as local forest settlers and stockmen.

This year a personal letter was sent to storekeepers in towns on the border of the forest where campers and fish-

user and settler on the Forest, and also to all local newspapers. The papers invariably printed the entire letter, without being asked to. Wherever the words "fire" or "fires" occurred in the letter the printing was in bright red,

Going Fishing?

The finest trout streams, the best hunting grounds and the most beautiful camping places in America are to be found within the National Forests

90,000,000 PEOPLE are joint owners of the National Forests

YOU are one of this number

Help Prevent Forest Fires

LIGHTED MATCHES, CIGARS AND CIGARETTES ARE DANGEROUS

Put out your camp fires before leaving
Don't build bonfires

Keep the Forests Green

U. S. Department of Agriculture

Forest Service

ing parties outfit, as well as hotels within and near the forest, enclosing a "Going Fishing" card and a supply of the "Six Rules," samples of which are shown. These persons were asked to post the "Going Fishing" card in their places of business in a conspicuous place and to give out the "Six Rules" cards to sportsmen, tourists and others.

In addition to these, a fire letter was printed and a copy mailed to every

and in heavier type, and the letter was signed in red ink.

The printed fire letter idea is followed very extensively by forest supervisors as the most effective and practical means of reaching all the users of a forest. It is only a part of a campaign that is being carried on to bring before the public the reasonableness of forest protection through fire prevention.

The Six Rules

For Care with FIRE in the Mountains

If Every Member of the Public Strictly Observed These Simple Rules, the Great Annual Loss by Forest Fires Would Be Reduced to a Minimum

1. Be sure your match is out before you throw it away.
2. Knock out your pipe ashes or throw your cigar or cigarette stump where there is nothing to catch fire.
3. Don't build a camp fire any larger than is absolutely necessary. Never leave it even for a short time without putting it OUT with water or earth.
4. Don't build a camp fire against a tree or a log. Build a small one where you can scrape away the needles, leaves or grass from all sides of it.
5. Don't build bonfires. The wind may come up at any time and start a fire you cannot control.
6. If you discover a fire, put it out if possible; if you can't, get word of it to the nearest U. S. Forest Ranger or State Fire Warden just as quickly as you possibly can.

CALIFORNIA'S SITUATION.

Alexander W. Dodge, deputy state forester of California, writes as follows about the situation there. He says:

Although the citizens of California recognize the magnitude of their forest wealth and its bearing upon the industrial activities in every community, there has been an evident unwillingness on the part of many to realize the importance of adequately protecting our forest areas from fire. California ranks third in her timber supply. There are within the State vast areas of hill and valley land dependent directly upon an already limited water supply. Thousands of acres of brush and timber land throughout the State serve as indispensable regulators of stream flow and each year our watersheds suffer serious damage from the ravages of fire. The total money damage due to forest fires in California during 1913 was \$511,077.00, an amount sufficient to maintain

the State forestry department, at its present annual appropriation, for twenty-three years. This destruction will continue until measures are adopted to prevent it. The citizens of California, and of other States which have similar problems to solve, must face the issue squarely and admit as positive the following facts:

1. That forest fires do occasion a very great annual loss in dollars and cents.
2. That all of their industries depend directly or indirectly upon the forests and streams.
3. That they cannot afford to permit the annual loss to continue.
4. That they have not given this great problem a fair degree of attention.
5. That there are measures and means of preventing the frequent occurrence of forest fires.
6. That what is lost in one year is sufficient to establish and maintain a protective force for several years.
7. That they should make generous legislative provision for the adoption of measures and means of protection.
8. That sooner or later they, like other countries, will be forced to protect their forests and perhaps grow them again and, that the longer the wait the greater will be the cost of protection and reforestation.
9. That forest protection is a function of the State.
10. That (in California especially) there is a long dry season during which fires start readily.
11. That a bad example of conservative use has been given the present generation by the former one in this country; that it is a dangerous example to follow; and,
12. That forest fires will not put themselves out.

PROTECTIVE LEGISLATION

Whatever agencies effect the value of land and other public commodities are of public interest. There is a gradual change in public sentiment as indicated by attempts made to secure forest legislation in the State. With a forest



A FOREST FIRE AT NIGHT

THERE ARE FEW MORE IMPRESSIVE SIGHTS THAN A FIERCE FOREST FIRE BY NIGHT, WHEN THE GLARE LIGHTS THE HEAVENS AND MAY BE SEEN SCORES OF MILES AWAY.

wealth far greater than that in many other States, California still fails to occupy the place she should in forestry. We realize that some other States are developing effective protective policies to prevent the indiscriminate exploitation of their forests. However, we cannot extensively accomplish forest protection until the lumbermen become more thoroughly awakened to the practical necessity of the work. Unfortunately, some of the lumbermen are mistrustful of any agency directed toward forest regulation, fearing, it seems, that unfavorable and impracticable restrictions will be subsequently imposed; and the general public is in some degree influenced by this attitude on the part of the lumbermen.

California is a great playground, her forest wilds attract thousands of pleasure seekers every summer. There must be provision for fire patrols, summer guards, paid fire wardens, effective co-operation between Federal, State and private agencies, and the operation of all necessary protective measures.

Such forest legislation will make it possible for California to enjoy:

State fire patrols, whose duty it shall be to lessen the danger of fire by keeping vigilant watch during the dry sea-

sons. At present we have only a system of non-compensated voluntary fire wardens; the plan is very inefficient. Full appreciation is expressed of the effective work done by the Federal Forest Service on the nineteen national forests within the State.

State forest reserves, which are certain tracts of land within the State owned and managed by the State. These reserves will prove as valuable in California as they have and are proving in other States.

State experimental stations, for as forestry advances in California we will need demonstration areas where the relative merits of various indigenous and introduced trees can be determined. Highway planting is already popular and trees for this purpose will always be in demand.

State nurseries where forest and highway trees can be propagated for distribution throughout the State.

State timber tax reforms as the old, and generally abandoned in other countries, system of forest taxation still operates in California—the general property tax. The farmer is taxed on his crop, not by an increasing tax at periods during its growth, but upon the commodity when harvested. The pres-

ent timber tax is levied annually, ever increasing, and forces the owner to cut some trees before they are actually ready to cut. The future will demand that a nominal tax be levied, annually, upon the land, and a fair revenue paid by the owner upon the timber when it is logged.

Cooperation with Federal, private, county and other agencies will enable the State to realize to the fullest extent the enjoyment of her natural resources.

We do not believe that the people of California, nor of any other State of

this great Union, citizens alive to the right sort of government, are going to remain quiet and fail to take a stand for the conservation and wholesome development of their natural wealth. The future will demand of us a reckoning; let us make the future monuments to our industrial success productive forests instead of devastated areas of charred stumps noted only for their forests of the past. The possible floods and dry river beds of the future can be largely prevented by protecting our forests now.

33,000 ACRES MORE

ALITTLE more than 33,000 acres in the White Mountains have just been approved for purchase by the Government at a meeting of the national forest reservation commission.

These areas are in two separate tracts, both in Grafton County, New Hampshire, the larger containing 31,100 acres on the watershed of the Pemigewasset River, a tributary to the Merrimac. The tract comes within a mile of North Woodstock on the Boston and Maine Railroad, and several good roads lead through it. The land is between 700 and 4,300 feet in elevation, and in the lower valleys are a number of abandoned farms now grown up to trees. Most of the conifers have been cut to make paper pulp, but there are good stands of beech, birch, and maple of considerable value. With fire kept out there is said to be excellent

promise of a new stand of spruce. The price agreed upon by the Government is \$4.62 an acre, including both land and timber.

The smaller purchase consists of several areas lying on the watersheds of Little River and Gale River, both tributaries of the Connecticut. These lands cover 2,000 acres and are contiguous to lands already approved for purchase; hence they go far toward giving the Government a solid body of land in this locality. The price for the 2,000 acres, land and timber, is \$4.00 an acre. The tract is in the locality of the noted Franconia Range and is readily accessible from two railroad stations, Bethlehem and Twin Mountain. The forest has been cut over and consists chiefly of the northern hardwoods, though some spruce remains from the original stand.

Apache Forest Notes.

The altitudes of the Apache Forest vary from 3,800 feet to 11,463 feet above sea level.

A total of 2,692 acres was burned over by forest fires in 1913.

There are six sawmills and two shingle mills located within the Apache Forest.

There are approximately 20,000 acres of land within the Forest in patented homesteads or in homestead claims.

PHILIPPINE FOREST CONCESSIONS

WHILE there are two hundred billion board feet of merchantable lumber standing on the 60,000 square miles of Philippine public forests, in 1913 there were milled the small total of 80,000,000 feet, of which less than one-eighth was exported. Major Ahern, the insular director of forestry, believes there is an export market awaiting the establishment of milling enterprises, which would take three hundred million feet yearly, mainly of four woods—lauan, apitong, guijo and yacal. These trees grow to a very large size, a large number are found on a limited area and their extraction affords an attractive enterprise for a modern logging and milling operation.

These public forest lands in the Philippines are not sold but are developed under a license system. Yearly licenses are ordinarily given small operators for limited areas. The larger tracts are offered in the form of twenty-year exclusive licenses, which provide for the removal of timber and minor forest products without affecting the title to the land.

At present eleven such exclusive licenses, popularly called concessions, are in operation, representing American, British, Chinese, German, Spanish and Filipino capital. A recent timber concession was granted to a Chinese company that will find no difficulty in disposing of its products through its connections in China, while the British and German interests find their markets for Philippine woods in India and Europe as well as in China.

The forestry bureau now has available a number of tracts ranging in size from 35 to 300 square miles, with one or two of much larger size, awaiting applications.

A person considering such an investment is afforded every opportunity for investigation. The bureau of forestry desires each applicant or his authorized representative to visit the tract per-

sonally in company with one of the foresters, or that he have an experienced lumberman do so, in order that he may see the stand of timber, the facilities for haulage and transportation, the location of mill sites and ascertain for himself the local labor supply.

The concessions themselves cost nothing; the charges being in the form of stumpage fees, payable upon removal of the product and running from \$1.00 to \$5.00 per thousand feet. When an application, complying at least with the minimum requirements as to the size of the mill and the annual output, has been received, the tract is advertised for a period of four months. In awarding the concession preference is given to the bidder offering to install the most complete and effective plant and giving the best security for performance.

The concessions are given for tracts large in proportion to the capacity of the mills installed in order that the future condition of the forest will not suffer. The amount of the annual production stipulated takes into consideration both the present amount of over-mature timber and the amount annually maturing, and in other ways the regulations seek to conserve the forest wealth while rendering available the mature timber with the fewest possible restrictions.

One of the important elements is sufficient capital to install machinery capable of handling the large hardwood logs, for which some of the earlier plants proved hardly adequate, and to permit a proper seasoning of the product. The security the Philippine Government requires that the concessionaire give is very modest in proportion to the amount of raw material placed at his disposition—when a bid is submitted a deposit of a certified check, usually for \$5,000, is required, and then after the award is made, the equipment on the ground and the concessionaire about to begin operations, the certified check

may be replaced by a satisfactory form of bond.

One of the important functions of the insular bureau of forestry is that of making available to investors the fullest information, and lumbermen visiting the islands will not only secure general data from its headquarters at Manila but will supplement this in the various

localities by the cooperation of the forestry men in the field.

The Bureau of Insular Affairs at Washington has general descriptions and maps showing the location of a number of the tracts available, which will furnish preliminary data to those who may be in a position to be interested in developing this most promising field for hardwood lumber.

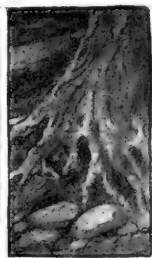
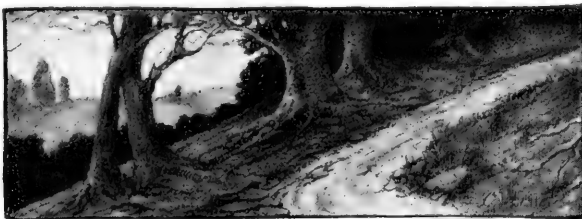
WHITE MOUNTAIN CONFERENCE

THE sixth annual forestry conference in the White Mountains, under the auspices of the Society for Protection of New Hampshire Forests, with the cooperation of the State Forestry Commission, will occur at Gorham, N. H., July 21-23, 1914. This charming mountain town, in the heart of the White Mountains, is headquarters for the White Mountain National Forest, that now comprises 138,000 acres. It may be reached by the Boston and Maine Railway with through connections from New York and Boston, or by the Grand Trunk Railway with through trains from Portland.

Gorham is twelve miles from Berlin, N. H., famous for its paper and pulp mills. A cordial invitation has been received for members of the conference to visit the works of the Berlin Mills Company and see the processes of making paper. Excursions will be made also over the Presidential Range through the National Forest on the north, and into the Great Gulf and Tuckerman's Ravine on the south.

Those who desire can take the carriage road up Mount Washington.

Taxation of Forests, State and Town Forests, Planting Forests, Forestry Investments, and the National Forest in the White Mountains are among the topics that will be considered. Dr. B. E. Fernow, President of the Society of American Foresters; Professor Chas. J. Bullock, of Harvard University; Mr. Clyde Leavitt, of the Canadian Forest Service, and Mr. J. St. J. Benedict, Supervisor of the White Mountain National Forest, are among those who have been invited to take part. Investments in forest lands will be discussed by Mr. Charles M. Dow, Director of the Letchworth Park and Arboretum. Mr. Montgomery Rollins, of the Financial Publishing Company, has been asked to speak upon Security in the Purchase of Timber Lands. Mr. Charles Lathrop Pack, President of the National Conservation Congress, has indicated that he will attend. Dr. E. T. Fairchild, President of the New Hampshire State College, will speak upon Cooperation in Forestry Work.



NEW STYLE SHEEP HERDING

AS a result of experiments during the past few years, the Department of Agriculture is now advocating the use of the bedding-out system of herding sheep on open ranges, instead of the old close-herding system which has heretofore been in use.

This system gets its name from the fact that the herder who attends the band camps and beds his flocks wherever the sheep find themselves at nightfall. Under the old plan he established a fixed camp and bed-ground and drove the sheep back to the same place each night.

Through experience on the national forest ranges last year the Department states that lambs from bedded-out bands were five pounds heavier on an average at the end of the season than those which were trailed to and from established bed-grounds, and that the range can carry from 10 to 25 per cent more sheep than when so much is trampled out in traveling back and forth. The disadvantages of the old system, according to the Department, were twofold, those to the forage and those to the sheep. The forage suffered by being trampled badly, and being actually destroyed at and near the bed-grounds; the sheep lost weight in going to and from the camps, and in

dry weather suffered not a little from dust and from crowding.

Moreover, under the old system the sheep were kept pretty well bunched; under the new plan they graze at will in scattered, open flocks. During the day the herder moves about in a wide circuit around his charges, looking for tracks to see that none of the sheep has strayed beyond his circle. The sheep are constantly moving through new feed instead of traveling over areas already fed over.

Sheepmen have maintained that the close-herding system so long in use was necessary to prevent losses from straying, and from the ravages of animals, such as wolves, coyotes, and mountain lions. The experiments of the Service show that straying can be prevented, and one band on the Payette forest, Idaho, which never bedded two nights in the same place, and which grazed in timber and brush practically the entire summer, lost only four head; in this, as in the majority of cases, the loss under the new system was less than under the old one of close herding.

The forest rangers and trained hunters of the service cooperate with the herdsmen to rid the ranges of predatory animals, and to render the danger of loss from this source less than it was formerly.





THE WRATH OF THE RIVER

RACHEL L. DITHRIDGE.

The River-god comes raging
Where stately cities stand;
And when his fury faints and falls
All desolate the land!

“Away, where my streamlets started
Ye have robbed me of my trees!
I yearn for a grace departed,
For the voice of birds on the breeze.

“I have given you faithful service
As I crept thro’ valley and plain,
Though my quiet waters quivered
At the shriek of your thundering
train.

“But ye have despoiled my birth-right
To build you the homes of men;
And now I descend upon you
To ransom my own again.

“I will wreck the homes ye have
built
With the forests hewn from my shore;
I will take as toll your children
As ye took my wealth of yore!

“And at last when my rage is silent
And the sullen flood is o’er,
Forget not the wrath of the river
Lest I should return once more.”

The River-god comes raging
Where stately cities stand;
And when his fury faints and falls,
All desolate the land!

INJURY TO THE LARCH BY SAWFLY LARVAE

By MAUD DEWITT PEARL

PROFESSOR A. G. HARPER, of Oxford, England, has recently published the results of a most thorough investigation of the harm which Sawfly larvae do to the larch. This pest first made its onslaught upon larches in England in 1904, attacking not only the European larch but also species of the Japanese larch, which had recently been introduced into England. Most of the trees investigated had suffered defoliation during several successive years.

In order to study very accurately the extent of injury wrought by defoliation, a cross section from each tree was taken regularly, every four or five feet apart, depending upon the tree, from the base to the top. A rectangular piece, from 8 to 12 mm. broad, was cut out of the circumference at the four points of the compass, the north side of the tree having been marked previous to cutting. A thin layer was cut from each one of these blocks for microscopical examination and measurement. Three separate sets of measurements were made for ring growth and development of the autumn wood on each layer, so that, in all, twelve measurements were taken for every cross section. The average of these measurements was taken as an indication of the mean radial enlargement of the tree at a particular height.

The investigation showed that defoliation and consequent starvation re-

sulted in a lessening in the amount of growth of the annual ring and in a decrease in the thickness of the walls of the cells forming the so-called autumn wood. The decrease in ring growth was more noticeable at the base of the tree than at the tip, as would be expected. In cases of severe attacks of the larvae it was found that cambium growth ceased entirely in certain parts of the tree, particularly near the base. The width of the ring of autumn wood was not always lessened, but the outer cell walls of this ring failed to thicken while the inner walls presented a normal appearance. The cause of this difference between the walls of the outer and inner cells is not perfectly clear. Possibly the starvation which the tree suffers through defoliation causes an arrest of the development of the cells. On the other hand there is an indication that in some cases the second growth of leaves which the tree very often puts out after being attacked by the larvae might possibly be the cause of the thin walls. The growing leaves draw heavily upon the water supply and conditions at this time are similar to those in early summer when the regular leaf growth occurs and the so-called spring wood, whose cells have thin walls, is formed.

Another condition which results through defoliation is the formation of abnormal resin ducts.

Red Alder for Clothes Pins.

Manufacturers have found that red alder from the Pacific coast is a suitable material for clothes pins. Alder makes a white, smooth, springy pin. As a result of this fact, a clothes pin factory, said to be the first on the Pacific coast, may be established at Portland, Oregon.

Best Sight of Forest Fires.

It is said that the best times of day to see forest fires from lookout stations are just after daylight and just before sunset.

THE CANADIAN DEPARTMENT

BY ELWOOD WILSON.

[With this issue AMERICAN FORESTRY inaugurates a Canadian forestry news department for the particular benefit of its many Canadian subscribers. The matter will be furnished by Mr. Elwood Wilson, one of the best known Canadian foresters, and will consist of news and comment on forest and timber conditions and forestry and lumbering work.—EDITOR.]

THE forestry situation in Canada is a very promising one and is gaining strength slowly but surely, quietly but effectively. From the standpoint of Government the situation is a most excellent one, as practically all the forest land in Canada is owned by either the Dominion or Provincial Governments and is not being sold but only leased, the leases being subject to frequent renewals and the rentals to readjustment. The regulations under which these lands are administered are on the whole wise ones, and politics, while not yet wholly eliminated, still do not play a very serious part.

The fire situation has been very bad up to a few years ago, but with the advent of Cooperative Protective Associations this has been much improved. The Quebec and Dominion Governments have given their earnest support to these associations and are urging their formation all over Canada. British Columbia has also instituted an efficient fire-fighting system. Ontario and New Brunswick are still worrying along in the good old way. Under the Dominion Railway Commission the railroads have been compelled to clean up and patrol their rights-of-way, and the burden of proof in case of fire has been placed on them. In the Rocky Mountain section they are required to use oil-burning engines. The Government has not yet applied its regulations to the Government-owned roads, but it is hoped that this anomaly will soon be done away with.

The Dominion Forest Service is well organized and is doing good work in

establishing reserves, making reconnaissance surveys and helping the prairie Provinces to plant trees. It is still troubled with the patronage system in the outside service.

The Province of British Columbia has the best organized and most efficient Forest Service of all the Provinces and is doing excellent work along the line.

Ontario has no forest service worthy of the name. Although a trained forester has been appointed, his hands are tied and he is hardly allowed to even suggest anything.

Quebec has a Forest Service with two Yale graduates at its head, and they are slowly paving the way for better administration of the Government's timber holdings. Some reconnaissance work has been done, a Forestry School and a tree nursery established and some planting on sand dunes commenced. A classification of lands has also been begun, and it is hoped that future sales of settlers' lands will be made on the basis of their fitness for agriculture. The Minister of Crown Lands has taken the keenest interest in proper fire protection and has aided the Cooperative Association in every possible way.

New Brunswick and the Maritime Provinces have as yet no Forest Service.

The Forestry Department of the University of Toronto has done most excellent work and has a strong faculty headed by Dr. Fernow. The graduates have mostly gone to fill the services of the Dominion and British Columbia Governments and have done good work.

The Forestry Department of Laval University, conducted by the Quebec Government, has so far only turned out men for the Government's own work, which for sometime is likely to absorb its graduates.

The Forestry Department of the University of New Brunswick is doing good work, and its graduates are mostly taking private positions.

The Canadian Forestry Association has been the most important agency in the introduction and propaganda of forestry and has done most excellent work. It receives a subsidy from both the Dominion and Provincial Governments and has been successful in obtaining important legislation. It conducts the *Canadian Forestry Journal*, published monthly.

The Canadian Society of Forest Engineers was organized in 1908 and has now about fifty-five members. Its aim is to foster closer relationship between foresters, to keep up the standard of the profession to the highest possible plane and to help its members to mutually benefit one another.

The Society of British Columbia Foresters has the same aims for the men in the British Columbia Service.

The Ottawa Foresters' Club does the same thing for Dominion and other foresters residing in Ottawa.

The Commission of Conservation has its forestry side and has done much work already. Its publications on the Forest Resources of Nova Scotia and its report on the Trent Watershed are of high character and importance and are an earnest of what may be expected.

The Dominion Railway Commission through its Fire Protection Service has done more to eliminate the greatest source of fire danger, the railways, than anyone would have believed possible. The railroads have been responsible for the burning of enormous tracts of valuable timber lands, and until the Railway Commission took up the matter the railways could not be compelled to take any preventive measures.

The St. Maurice Forest Protective Association, formed in the spring of 1912, has been a revelation as to what could be done toward fire-protection. Formed by all the holders of freehold and licensed lands in the St. Maurice Valley of Quebec with 11,373 square miles it has now grown to cover 12,535 square miles and really protects a much larger area than this.

The Lower Ottawa Forest Protective Association was formed this spring by the large lumber industries in the lower Ottawa Valley and has already done good work.

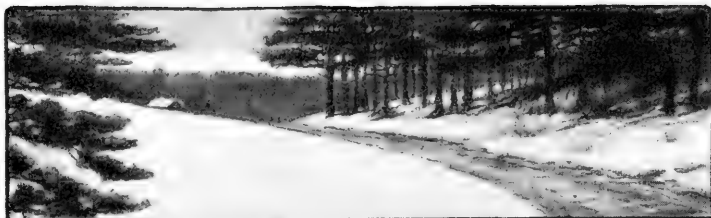
The Canadian Pacific Railway has a well-organized Forestry Department and has done good work in tree planting for snow protection along its right-of-way in the prairie Provinces and has made a beginning in reconnaissance surveys of its lands.

The New Brunswick Railway Company is developing a system of fire protection along its right-of-way, beginning by clearing up for fifty feet on each side of the track.

The Algoma Central and Hudson Bay Railway has just engaged a Forester.

Long Distance Fire Reporting.

On the Deerlodge National Forest in Montana one lookout station has the record of reporting accurately, by distance and direction, a fire that was sixty miles away.



EDITORIAL

SECRETARY LANE'S proposal for the control and management of Alaska's natural resources by a Development Board consisting of three members, instead of by various departments of the Government to do away with the red tape which he believes complicates the development of Alaska and discourages efforts to establish claims and open up the country. There is no doubt that the control of various resources by various departments results in confusion, delay and discouragement; that the profusion of laws governing the development of these resources causes unnecessary complications; and that improvement in conditions are necessary if Alaska is to be unlocked and her resources used.

But we do not approve of Secretary Lane's plan to include the control of the national forests of Alaska in the hands of such a Board as he proposes. We believe this would be a mistake. The Forest Service has shown its business capacity in the management of the Alaskan national forests as well as those in the United States, and this management is year by year becoming more and more efficient. What is being so well done now could not be im-

proved upon by a Board which would have to attend to other important resources as well. Delay, red tape and confusion are not apparent in the management of the forests under control of the Forest Service; in fact, quick decision and speedy action has been noticeable in practically every case applying to the National Forests in Alaska since the Forest Service had control.

Secretary Lane suggests that the Forest Service act in an advisory capacity with the Board, if it is created, but this would not do, because the Forest Service would not have control of the men employed on the forests nor of their work.

The proposed law should be amended to provide that the Forest Service retain the administration of the national forests of Alaska and act in conjunction with a Board, or the necessity for such a Board might be entirely removed by a revision and a correlation of the existing laws by means of which control and direction of the country's resources could be concentrated in a few departments, and the whole operation of administering the resources of the country thoroughly simplified.

AS THIS number of AMERICAN FORESTRY is being read, officials and members of the American Forestry Association will be addressing some seven or eight thousand teachers, representing every State in the Union, at Chautauqua, N. Y. These teachers will be told why the conserva-

tion of the forests is one of the most important problems of the day, and of what vital necessity it is to future generations. The ablest experts and speakers in the cause of forestry will be there, and the teachers will not only hear about forestry but will see moving pictures and stereopticon views which

will speak for themselves. They will be shown the destruction wrought by forest fires and how such fires may be prevented; they will be told how the trees of the forest have to battle for existence and how they may be aided in the fight; they will be shown how rapid deterioration of the human race follows the loss of the forests; they will be told about the problems of the lumbermen, and they will have explained to them just what they may do to aid in the work of teaching every man, woman, and child to appreciate a tree whether on the street, lawn, woodlot

or forest and to value it for the value it is to mankind.

It is not expecting too much to believe that these seven or eight thousand teachers will return to their homes with the determination to do some service in the cause of forest conservation, nor is it at all doubtful that each and every one will succeed in imparting to others some of the knowledge they will gain. Hence it may be said, without exaggeration, that what the American Forestry Association will say to the teachers at Chautauqua will, in part, be repeated to fully half a million others.

DESPITE the facts that Georgia annually places on the market forest products valued at \$18,000,000 and that the wages paid to produce this output amount to \$2,500,000, the State has no law providing for a forestry department, and it is the only State in the South which does not cooperate with the United States Forest Service under the liberal provisions of the Weeks law, in protecting its forests from fire.

The State Legislature is now in session and the members of the legislature could do no greater good to the business interests of the State, and more or less directly to every one of their constituents, than to take up for consideration such a forestry law as exists in Maryland, or Kentucky, or in any one of a score of other States. A Forestry Department, with an appropriation of \$15,000 or \$20,000 a year, could do a

wonderful work in conserving the lumber industry of the State. There is at present much wasteful cutting, there is unnecessary loss from forest fires, there is absence of knowledge on the part of timber land owners, and lumbermen, of the best means of caring for the forests and of cutting the timber to the best advantage. A State Forestry Department, with competent officials in charge, could do much to overcome conditions which do not make for the best results.

Thousands of acres of land are owned by the State and much of this land could be made to produce forests providing there was in existence a State Forestry Department and good working laws for its operation.

All of this is well worth considering, and it is to be hoped that some member of the legislature will be sufficiently interested to lead the way.

IN CONCLUDING its last report the Conservation Commission of Louisiana made the following hopeful statement:

"The Commission hopes to establish later on a separate department of forestry which will give to this branch of the work the special attention demanded by so important a division of the State's natural resources."

In the same report the Conservation

Commission estimates that at the present rate of cutting, it will be safe to estimate that the pine timber of the State will be exhausted in thirty years, the cypress in twenty years and the hardwoods in thirty-five years.

This means that in practically thirty years the enormous revenue derived from the forest products of the State will not only be ended but that the forested land of the State will be so bare

that damage by floods and erosion will likely cost the State hundreds of thousands of dollars a year.

With these facts before them and with the knowledge that the protection of its vast extent of timber is undoubtedly one of the foremost concerns of the State, the Commissioners are cheered by the knowledge that the appropriation available for the general purposes of the Commission is much greater for the present fiscal year than it has been before. This being the case, it appears that one of the first duties of the Com-

mission should be to establish a State department of forestry so that special attention may be given to the State's timbered land. Fortunately, the members of the commission—M. L. Alexander, J. A. Dayries and E. T. Leche—are broad-minded, wide-awake men who see the necessity for forest conservation and who will doubtless do all that they can to protect the forests of the State. It is to be hoped that soon will come the announcement that the forests have been placed under the management of a special forestry department.

IT IS gratifying to every supporter of forest conservation to know of such a broad-minded expression of opinion by W. B. Townsend, of Townsend, Tenn., a lumberman, who in a paper written for the meeting of the North Carolina Forestry Association at Asheville, N. C., on June 10, said:

"I am mightily interested in what I call an 'Imperial Domain'—the Great Appalachians and their timber, comprising, I am told, more than 235 million acres, extending from Maryland to Texas, including Arkansas, Oklahoma and Missouri. This domain is considerably larger than all of the New England States, combined with New York, Pennsylvania, Ohio, Illinois, Indiana and Wisconsin, comprising not only nearly half of the remaining timber supply of the United States, but by far the most valuable kind. This means that through a spirit of conservation this immense supply of timber and the proper marketing of it is brought more and more to the attention of those directly and financially interested, and that by proper management and wise use this source of wealth to the South can be made to yield perpetually an income, which, in importance and size, is second only to the South's cotton crop. This feature is especially perti-

nent for the reason that practically half of all the timber cut in the United States in 1913 was cut in these southern States.

"A very necessary item that should not be overlooked is that of eliminating politics from the true conservation of this timber crop. With an appropriation of sufficient funds for fire protection and these funds properly administered the perpetuity of this great industry will be insured.

"I am, as stated, mightily interested and it seems to me that all of us should be interested in seeing this timber conserved, manufactured and marketed in an intelligent manner; not in a manner attempted by one of our northern States, where not even the mature and ripe timber is permitted to be cut, but allowed to go to waste. What we manufacture should be manufactured and marketed in a manner whereby it will be profitable to the community and of advantage to the consumer and with a reasonable and proper compensation for the poor fellow who has the hard knocks to contend with. Let us not lose sight of the fact that the logger and the lumberman are, as a rule, in the strictest sense of the term, the real pioneers of the community in which they operate."

Peeling Pulp Wood.

James W. Sewall, of Old Town, Maine, has a crew of men employed in peeling pulp wood at Lowell, Maine.



FOREST NOTES

Cornell's forestry school has a girl student. She is Miss Mabel G. Beckley, and she is the second girl student the school has had in the past ten years. Miss Beckley is devoted to the subject and is doing admirable work, not only in the schoolroom but in the field work as well.

Hubert Somers, of the Somers Brick Co., of Bakersville, N. J., reports finding some well preserved logs under the clay deposit in the company's brickyard there, and has sent a piece of one to the American Forestry Association's office. The logs were found about 24 feet under ground, the surface there being some forty feet above sea level. State Geologist, Henry B. Kummel, of New Jersey, estimates that the log is probably 50,000 years old. At a comparatively recent period, geologically speaking, the southern portion of the State stood forty or fifty feet lower than at present. Previous to this submergence the land stood about as high as at the present time. Then grew the trees of which the logs found are a part. Followed the submergence and then the formation of the clay beds and thousands of years later the rising of the land again to its present level.

The seventh congress of the International Union of Experimental Forest Institutes will be held in Hungary from Sept. 7 to 17 with the start of the excursions and the meetings at Budapest. The delegates will visit, by train and au-

tomobile, a number of the forest schools throughout the country and hold a number of meetings and discussions during the period they are together.

The cruising and engineering department of the L. E. Campbell Lumber Company of Detroit, in charge of Charles A. Barnum, has just issued a very attractive pamphlet on the value of skilful cruising of timberland and the necessity of consulting forest engineers when in search of accurate knowledge of timber holdings.

The *Ames Forester*, published annually by the Forestry Club of the Iowa State College, made its appearance in June and contains excellent articles by Prof. Nelson C. Brown, of Syracuse; H. H. Richmond, W. G. Baxter, A. F. Hoffman, L. P. Wygle, Prof. L. H. Pammel, and Prof. G. B. MacDonald. It is well illustrated and is a publication of which the school may well be proud.

The Department of Agriculture has just issued a pamphlet on Systematic Fire Protection in the California Forests, by Coert DuBois, district forester of District 5, with headquarters in San Francisco. It is for the district officers and not for public distribution, and is designed to show how the forest fire problem must be worked out, the best methods and the most suitable apparatus employed in fighting it and in protecting the forests and how the high-

est standard of efficiency in the work may be secured and maintained. For-ester DuBois has had particular success in forest fire work, and whatever conclusions he draws as a result of his wide experience are of marked value.

There has been much in the newspapers of late about the volcanic activity of Mt. Lassen, in California. Forest Service officials, however, who are on the ground, are reported by newspapers as saying that the disturbance is due to a geyser and is not volcanic. No smoke is ascending, but the steam forces upwards a large quantity of light-blue ashes and these have been scattered over portions of the country to a distance of twenty miles.

This season's reforestation work on the Black Hills National Forest in South Dakota covered an area of 867 acres by direct seeding of yellow pine. This is the tenth consecutive year that work of this character has been done and a total area of over 6,000 acres has now been covered. The results have been uniformly successful and prospects for the establishment of a good forest cover on the Roubaix burn are very good.

In addition to the direct seeding 15,000 two-year-old yellow pine and 5,000 Douglas fir seedlings were planted.

Ralph M. Hosmer, who for several years has been director of forestry in Hawaii, has accepted the offer made to him by Cornell University to take charge of the forestry department there in place of Prof. Walter L. Mulford, who becomes the head of the department of forestry at the University of California at Berkeley, Cal.

At this writing a State forester for Virginia has not yet been selected. The new law went into effect on June 1. Several well-known foresters have been mentioned for the place and Dr. Alderman, dean of the University of Virginia at Charlottesville, where the State forestry department will be located, as

the University is to pay the expenses of the work until the meeting of the next Assembly, in 1916, is expected to make an announcement of the appointment at almost any time. The man who takes the place will find the majority of the people of the State eager to learn how to care for their woodlots and forested lands, and it is generally expected that he will make such a good showing, for there is the opportunity to do so, that the citizens will insist upon their legislators, two years hence, providing a substantial appropriation for carrying on the work.

During the spring of this year 867 acres of the area known as the Roubaix Burn, in the Black Hills National Forest, were reforested by direct seeding. In addition, 15,000 yellow pine and 5,000 Douglas fir seedlings were planted.

This year's work marks the tenth consecutive year this reforestation work has been done on the Black Hills National Forest. According to Forest Supervisor Kelleter, some of the earliest successful work done by the Forest Service was done on the Black Hills National Forest, and at the present time a very good stand of thrifty trees of good size is to be found on the oldest areas. Up to the present time a little over 6,000 acres have been reforested by direct seeding.

Members of the North Carolina State Forestry Association and the Appalachian Park Association held a joint meeting at Asheville, N. C., on June 10 and enthusiastically discussed forest conditions in North Carolina, and also the progress being made in securing an Appalachian Park. Dr. Joseph Hyde Pratt, State geologist, presided and there were several excellent addresses. Mrs. William J. Cocke, of Asheville, told how interested the women of the city are in the effort to conserve the forests of the State; State Forester Barton of Kentucky spoke about conditions in his State, and a very sound and practical address on the relation of the lumbermen to forestry was made by W. B. Townsend, of Townsend,

Tenn. At the meeting of the Appalachian Park Association Assistant United States Forester W. L. Hall told about the acquiring of national forests in the Appalachians.

Hugh McRae, of Wilmington, N. C., was elected president of the State Forestry Association and State Forester J. S. Holmes was reelected secretary and treasurer. Resolutions deploring the death of George W. Vanderbilt and the departure of Dr. C. A. Schenck from this country, and also requesting a State appropriation of \$10,000 for forest fire fighting were passed.

The day following the business session the delegates and visitors spent in Pisgah forest, where they inspected the forest planting and viewed the tract of 86,700 acres recently purchased by the Government.

Foresters and conservationists all over the country were shocked by the untimely death, on June 11, of Overton W. Price, vice-president of the National Conservation Association of Washington, D. C., and former Assistant United States Forester under Gifford Pinchot. Mr. Price was one of the best known foresters in America, starting active work in his profession in 1899 after thorough preparation, and attaining credit and distinction in all he did. He served with Gifford Pinchot during the latter's term in the Forest Service, doing such excellent work that Mr. Pinchot dedicates his latest book, "The Training of a Forester," to him in these words: "To Overton W. Price, friend and fellow-worker, to whom is due, more than to any other man, the high efficiency of the United States Forest Service."

After leaving the Service Mr. Price devoted himself to his duties with the National Conservation Association and to private forestry work which included representation of the forestry interests of the late George W. Vanderbilt and work for the Canadian Government in British Columbia, and other details. He also made many valuable contributions to forestry and conservation literature, his last work of this kind being his

article in the June issue of AMERICAN FORESTRY. Mr. Price was in the prime of life, and his passing has occasioned widespread and heartfelt regret. His mother, his wife and four children survive him.

A comprehensive circular giving detailed information regarding the hotels, camps, transportation lines, and points of interest in the Yellowstone National Park has just been issued by direction of Secretary Lane. Travel to the Yellowstone has been developed to such a degree that there are listed two lines for the transportation of tourists, a hotel company operating five hotels, two camping companies operating stage lines and permanent camps, and five firms or individuals catering to special camping parties. There are descriptions of the formations of the terraces at Mammoth Hot Springs, the geyser basins along Gibbon and Firehole Rivers, and the Grand Canyon of the Yellowstone. The circular contains interesting notes on the varying action of the geysers, the colored pools, and the hot springs.

In New York's railways of over 8,000 miles practically all of the ties used in the tracks come from other States. Longleaf pine and oak are brought from the South and chestnut from the southern Appalachian Mountains. These ties now cost the railroads from 65 to 80 cents apiece, whereas 15 years ago they could be purchased for from 35 to 50 cents apiece. Many railroads are planting trees to supply ties for the future. Metal and concrete ties have proven to be unsatisfactory, as they lack the essential elasticity. In Germany and France more wooden ties are used annually in spite of the gradually increasing cost.

With the acquisition by the Federal Government of Pisgah Forest, the property extending through the forested part of three counties of western North Carolina, there comes to lumbermen and other owners of woodland

in that region the unexampled opportunity to secure adequate protection of their land from fire. The administration of the National Forests believes that fire protection to be effective must be general. They, therefore, not only protect their own lands by every possible means, but they endeavor to cooperate with all surrounding owners, as well as with the State, the railroads, and other agencies, in order to secure the best results.

The State College of Forestry at Syracuse warns owners of farms and country estates of the very serious danger which threatens the Hickory trees in the various parts of New York State. In some regions a large percentage (sometimes as high as 80 per cent) of the hickories have been killed by the hickory bark beetle, a small insect which lives between the inner bark and sap wood of the trees and by means of its tunnels cuts off the flow of sap to the upper part of the tree. The hickory tree in this State is doomed both as a shade tree and from a commercial standpoint unless active work is done to check this insect. This can be done only by cutting the trees killed the previous season and so disposing of the bark and branches as to destroy the young living insects within. The best way is to burn the entire tree or submerge it in water for two weeks. Ordinarily these measures should be taken before May 1, but this year, owing to the backward spring, the larvæ are still in the bark, and if the work is done thoroughly many trees which will otherwise be killed this summer may still be saved.

The Sophomore Summer Camp of the New York State College of Forestry opened on the Catskill Forest Station, near Tannersville in the Catskills, on June 1. Fifty-four Sophomores from the college will be in camp for eight weeks. As one part of the practical training at the camp the amount of standing timber on 2,000 acres of mountain land typical to that section of the

Catskills will be estimated. In addition, the boys will be required to study the growth of the various trees in order to determine how much timber can be removed annually without endangering the condition of the forest.

Interest in reforestation in south Ohio is increasing. By far the biggest project of this nature is that of the Carbondale Coal Company, the tract of which is located in the northern part of Athens County. Initial steps have been taken in reforesting the waste lands of the tract, which contains about 2,500 acres. The company has planted to date over 100,000 trees, mostly tulip poplar, pine and red oak, and it is their intention to extend the planting each year. The Carbondale tract is typical of the hill region of southeastern Ohio. Much of the area now idle is of the old field type, and is non-agricultural. The coves are well adapted to tulip poplar and the slopes to pine and red oak. Test plantations of white, red, ponderosa, Austrian and Jack pines, were made in the spring of 1914. While the native timber of this section is hardwood, some of the pines appear well adapted to old, worn-out fields, and it is quite likely they will be of service in the reforestation of much of the region occupied by the coal measures. A white pine planting, made four or five years ago by the Carbondale Company, while not successful, due to inferior planting stock, indicates that the species is well adapted to the conditions at hand.

The company has also undertaken the conservative management of over a thousand acres of second growth timber land. Cutting is being done according to forestry principles. The company maintains its own sawmill, and all mine timbers are supplied from the tract.

The Carbondale system is ideal and should be adopted by every coal company in Ohio, where conditions are similar. The President of the company, Colonel Richard Enderlin, is not only an enthusiast on forestry, but he has a remarkable insight in practical

forestry methods. He not only wants to improve his own forest property but wants others to do the same. No other man in Ohio manifests more public spirit or genuine unselfish interest in forest conservation, and he will be a power in advancing forestry in this State. His efficient Superintendent, Mr. M. H. Doolittle, is in active charge of the forest. With these two men at the helm great things can be expected at Carbondale.

Secretary Lane has appointed Mark Daniels as Landscape Engineer and General Superintendent of National Parks. The Secretary's appreciation of the necessity of a fixed plan as an essential in the economic administration and proper development of the parks resulted in this appointment. Mr. Daniels is from San Francisco and has recently completed an advanced investigation in the post-graduate departments at Harvard University upon the subject of the economic value of art, the results of which investigations it is hoped will be off the press early in the ensuing year. If his duties in connection with his present appointment will permit, Mr. Daniels will act as a mem-

ber of a commission to report to their respective governments upon the needs of several parks in Europe. Mr. Daniels will bend his energies toward the completion of a set of plans for each of the parks to the end that not only shall the inharmonious be eliminated, but that there shall be a definite plan for the park administrators to work to.

The Eucalyptus Hardwood Association of California held its first annual meeting recently and elected the following Directors to serve for the ensuing year: Mr. Wm. H. Brintnall, formerly President of Drovers' Bank, Chicago; Mr. L. M. Pratt, President of Pratt Eucalyptus Investment Company; Mr. F. S. Churchill, President of Los Berros Forest Company; Mr. C. F. Cook, associated with the Eucalyptus Culture Company, and Mr. C. H. McWilliams, President of the Southern California Eucalyptus Growers' Association. The Directors met and elected L. M. Pratt, President; F. S. Churchill, First Vice-President; C. F. Cook, Second Vice-President; C. H. McWilliams, Secretary, and Theodore B. Comstock, Treasurer.

NEW BOOKS RECEIVED

"THE FARM LOT," by E. G. Cheyney and J. B. Wentling. Price, \$1.50 (The Macmillan Co.).

Is an addition to the Rural Science Series which have for some time been a feature of the special publications issued by the Macmillans. The book, which is exceptionally well printed and illustrated, is designed to aid the farmer in the establishment, care and utilization of small patches of timberland on his farm and will be found of great practical benefit, as the authors have told in simple, precise English, and in popular style, just what to do with all kinds of woodlots and the best varieties of timber to encourage.

"THE TRAINING OF A FORESTER," by Gifford Pinchot. Price, \$1.00 (Lippincott's).

Certainly no man is better equipped than Mr. Pinchot to write of what is necessary in the training of a forester, and of what the aspirant for entrance into the profession needs. He very frankly says "I urge no man

to make forestry his profession, but rather to keep away from it if he can. In forestry a man is either altogether at home or very much out of place. Unless he has a compelling love for the Forester's life and the Forester's work, let him keep out of it." The book tells in succinct style what the forest is, what the forester's knowledge should be and of all the various steps in the development of a forester.

"LUMBER AND ITS USES," by R. S. Kellogg. Price, \$1.00 (The Radford Architectural Company).

Contractors, architects, builders, and even the lumbermen themselves have long felt the need of such a book as this, for it tells what lumber is, what the various kinds are best suited for and, in fact, as much in detail about lumber and its uses as any intelligent man, wishing the information, could ask. It is a book which should have a large sale and should be well worn by constant usage for reference by any possessing it.

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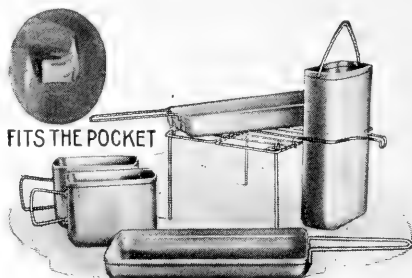
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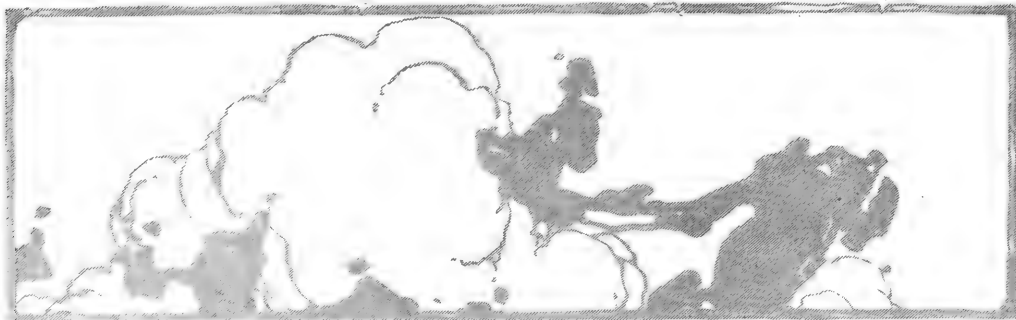
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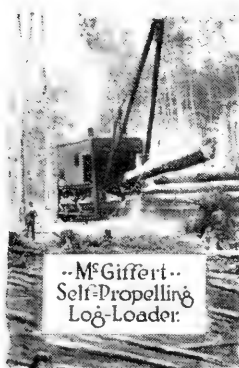
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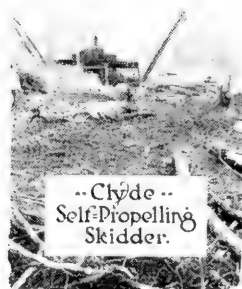


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CONTENTS

1914

OUR VANISHING FOOD FISH—By Hon. J. Charles Linthicum.....	543
With eighteen illustrations.	
NEW YORK CITY'S TREES.....	560
With nine illustrations.	
COMBINE AGAINST FIRES.....	567
THE LOOKOUT ON MOUNT LASSEN—By William C. Hodge.....	568
With four illustrations.	
ARREST FIRE LAW VIOLATORS.....	571
CRUISING IN CUBA—By E. V. Preston.....	572
With five illustrations.	
MY HEROES—(Poem)—By J. R. Simmons.....	576
THE STORY OF HEMLOCK—By Hu Maxwell.....	577
With nine illustrations.	
PESTS IN FOREST SEEDS.....	588
With three illustrations.	
FORESTRY AT CHAUTAUQUA.....	591
TROUT IN FOREST STREAMS.....	591
PRIVATE TREE PLANTING.....	592
A CHANCE FOR THE GAME—By Smith Riley.....	594
With eight illustrations.	
THE MISSOURI OUSTER CASES.....	602
USING BLIGHTED CHESTNUT.....	604
THE CANADIAN DEPARTMENT—By Elwood Wilson.....	605
EDITORIAL	607
FOREST NOTES.....	609
CURRENT LITERATURE.....	612

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- CUTTING OF MATURE TIMBER** where and as the domestic market demands it, except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.
- EQUAL PROTECTION** to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.
- CLASSIFICATION** by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

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OUR VANISHING FOOD FISH

By HON. J. CHARLES LINTHICUM.

ONE of the many stories attributed to Abraham Lincoln is that of a shrewd Yankee who entered a country store, took up a dried herring, and inquired its price. Told that the fish was a nickel he hesitated and asked the cost of a mug of cider. On being informed that it was the same price, he returned the herring and drank the cider. As he was leaving, the storekeeper halted him with the reminder that he had forgotten to pay for the cider.

"Why," exclaimed the Yankee, "I exchanged the herring for it."

"Well, then, pay for the herring," demanded the storekeeper.

"But, I didn't get it," protested the Yankee, "I took the cider."

As the Yankee disappeared down the road, the puzzled storekeeper scratched his head and observed:

"Well, consarn it, I've been done out of a nickel somewhere!"

This story was current when Lincoln was making his campaigns for public



A FISHING SCHOONER.

AN IDEAL TYPE OF THE SWIFT SAFE VESSEL FOR FISHERMEN. IT IS THE GRAMPUS, BUILT BY THE UNITED STATES GOVERNMENT.



COLLECTING COD EGGS ON A FISHING VESSEL.

ONE SOURCE OF COD EGGS HATCHED AT THE NEW ENGLAND STATIONS IS THE CATCH OF THE MARKET FISHERMEN. SPAWNTAKERS BOARD THE FISHING BOATS, OVERHAUL THE FISH, AND SAVE THE EGGS OF SUCH AS ARE RIPE.

recognition, for in those days a part of the stock of every country store was a barrel of cider and a supply of dried herring; hence the story is typical of conditions a half-century ago. Though cider is yet a part of the stock of every green grocery, but comparatively few of them now sell dried herring. The herring that were disposed of by millions to the small storekeepers throughout the land are no longer handled as extensively for food purposes, and that statement raises a most interesting query:

"What is becoming of the herring?"

WHERE THE HERRING GO.

If you visit the upper-waters of the Chesapeake during the Spring run of the herring you will witness scow load after scow load of that fish being sold to boats representing the fish fertilizer factories of Virginia. There is no attempt to conceal the traffic, no effort at

secrecy—the business is all conducted in the open light of day. You will see boatload after boatload, consisting principally of herring, but in which "are quantities of small white and yellow perch and other food fish" being carted off down the bay to be dumped into the capacious, ever hungry maws of the fish fertilizer factories of Virginia. This, then, explains what becomes of the herring which were at one time sold by nearly every grocery store in the land.

If you will continue your investigation you will find that throughout the Chesapeake basin boats from the fish fertilizer factories of Virginia visit the fishing fleets and purchase their herring. According to testimony given at a Congressional hearing, the fertilizer factory boats so dominate the fishermen that the latter decline to sell to others, as a result of which, in some sections the fertilizer boats enjoy a com-



THE FRESH-FISH FLEET AT T WHARF, BOSTON.

Larger quantities of fresh sea fish are landed at Boston than at any other port in the United States. The principal species are cod, cusk, haddock, hake, pollock, halibut, swordfish, and mackerel, together with lobsters, oysters, and clams. A day's receipts of fresh fish from the grounds off the New England coast have sometimes exceeded 2,000,000 pounds.

plete monopoly of the market. They purchase herring for less than others, and indeed so completely do they control the market, that the fishermen refuse to sell to individual consumers or to boats sent out by the packing houses who wish to purchase and pack for food purposes. Representatives of a fish-packing house were refused fish although they offered 50 cents more per thousand than the fertilizer boats. Their offer was declined owing to the fact that the fertilizer boats are always willing purchasers at their fixed prices, regardless of the condition of the market. The boats representing the fish packers, however, purchase only a certain quantity and desire no more. The result is, that the fisherman prefers to deal with the steady customer to whom he can at all times deliver his catch rather than with one whose purchases are limited.

More than 5,000,000 food fish caught in 1912 in the nets at the head of the Chesapeake Bay went into the machines of the fertilizer factories of Virginia. Three pound nets alone delivered 147,000 fish to the fertilizer boats in a single day.

The result of the use of herring for fertilizer has been a studious effort to increase the catch of that fish. With a market available under conditions which allow of no surplus or waste, the fisherman is able to regulate his day's earnings by the size of his catch. The profits are measured only by the quantity of apparatus the fisherman is equipped to operate and the number of fish taken.

What has been the effect? Intense fishing, the multiplication and extension of nets and traps of varied character, all for the purpose of increasing the catch regardless of the consequences.



LARGEST SEINE IN THE WORLD.

This seine, operated for shad and alewives at Stony Point, Virginia, on the Potomac River, was the longest net of the kind. The net proper was 9,600 feet in length, and the hauling ropes at the ends were 22,400 feet long, giving 32,000 feet as the total sweep of the seine, only one end of which shows in the illustration. The seine was hauled by steam power and the labor of 80 men, and was drawn twice daily, at ebb tide, throughout the season. As many as 3,600 shad were taken at one haul, and 126,000 in one season, and 250,000 alewives were caught at one time. Recently the season's yield of shad fell to 3,000, and the fishery was consequently discontinued in 1905 after having been carried on for a century. This seine was a source of eggs for the Bureau of Fisheries shad hatchery on this river.

The effect of this ruthless harvesting of the waters is shown in the decreased catch of herring at Ferry Landing, Virginia, where was located the largest seine on the Potomac River, twelve hundred fathoms long. It discontinued operation owing to the scarcity of fish. In former years, this celebrated fishing shore, with even a smaller seine, sometimes yielded 200,000 or more herring at a haul, and even up to ten or fifteen years ago took probably 15,000 to 30,000 at a haul. In 1913, the largest haul was 3,000 herring.

Virginia has laws forbidding the taking of herring in its waters for fertilizer purposes. Boats of the fertilizer companies of the Old Dominion, therefore, sail into Maryland waters, purchase herring and carry them to the factories in Virginia. Maryland has but

one small fish fertilizer factory and no laws against the taking of herring for use for fertilizer.

That many fishermen realize the moral wrong involved in thus diverting the herring from channels of the highest utility is evidenced by their statements. A representative of the Maryland State Game and Fish Protective Association says:

"Fishermen who have sold these fish for fertilizer have come to me and told me they believed it wrong and wished it could be stopped by law in this State, knowing that they were injuring themselves by thinking only of the present, with no thought of the future, but while it was lawful and others did it they would continue to do it also."

In justice to the fishermen it should

be stated that they point to the steady decline in the demand for herring for food and contend that more herring are not being sold for fertilizer than were heretofore sold for food, and ask what effect upon the supply of that fish has the use of the herring for one purpose than another? I do not positively affirm that the ease with which the fisherman may dispose of their catch to the fertilizer factories has contributed to the decline in the use of that fish for food purposes, but the situation certainly begets that suspicion. Conceding, how-

ever, in Long Island Sound, on the Pacific, and in the waters of Alaska, a flourishing traffic in this fish for fertilizer purposes is conducted.

The meat of the herring is delicious and it would be one of our most popular food fish were it not for its exceedingly numerous bones. The fish-leaving world awaits the coming of the genius who shall do for the herring what Eli Whitney did for the cotton boll. That Dame Necessity, who is the Mother of Invention, will produce this individual in good time, is not to be



FISHING FOR LOBSTERS.

BERRIED LOBSTERS, TAKEN FROM POUND AT BOOTHBAY HARBOR STATION (MAINE), IN COURSE OF TRANSFER TO WELLS OF THE STEAMER WHICH IS TO CONVEY THEM TO THE BUREAU OF FISHERIES HATCHERY FOR STRIPING.

ever, that the herring is an inferior food fish, is it economically wise to permit its unrestricted destruction for non-food purposes? Will not, within a comparatively short period, the increasing exigencies of our meat-food problem force this inferior fish into a place of importance in the diet of many of our people?

The use of herring for fertilizer is not confined to the waters of the Chesapeake. Along the New England

doubted, and even now there ought to be aspirants in the field for that honor.

The present year's catch of herring in the Chesapeake Basin is the smallest in the history of those fisheries. Nearly all the commercial fisheries failed to earn a profit and hundreds of the fishermen have been plunged into excessive debt. Indications point to next season being worse than the present, and the future prospects are discouraging.

THE DISAPPEARING SHAD

While I believe it will be generally agreed that it is economically unwise to permit fish as good as herring to be ground into fertilizer, it is not more wrong than those practices by which our waters are being robbed of that splendid delicious food fish, the shad. The Chesapeake basin affords such a striking example of the impending fate of this valuable fish when frequenting waters flowing through two or more States, that I shall confine my observations to those waters.

Before pointing out the pound-foolish policy of the fisherman toward this excellent market fish, let me explain that not many years ago so populous were the waters of the Chesapeake with the shad that large portions of this

toothsome fish were to be had in season, at even the cheapest eating houses in Baltimore. Families purchased the male and female shad at prices ranging from twenty to forty cents apiece. So excessively has its price increased that many of the cheaper eating houses do not now sell shad, while families purchasing the fish are compelled to pay from forty cents to one dollar and twenty-five cents per fish.

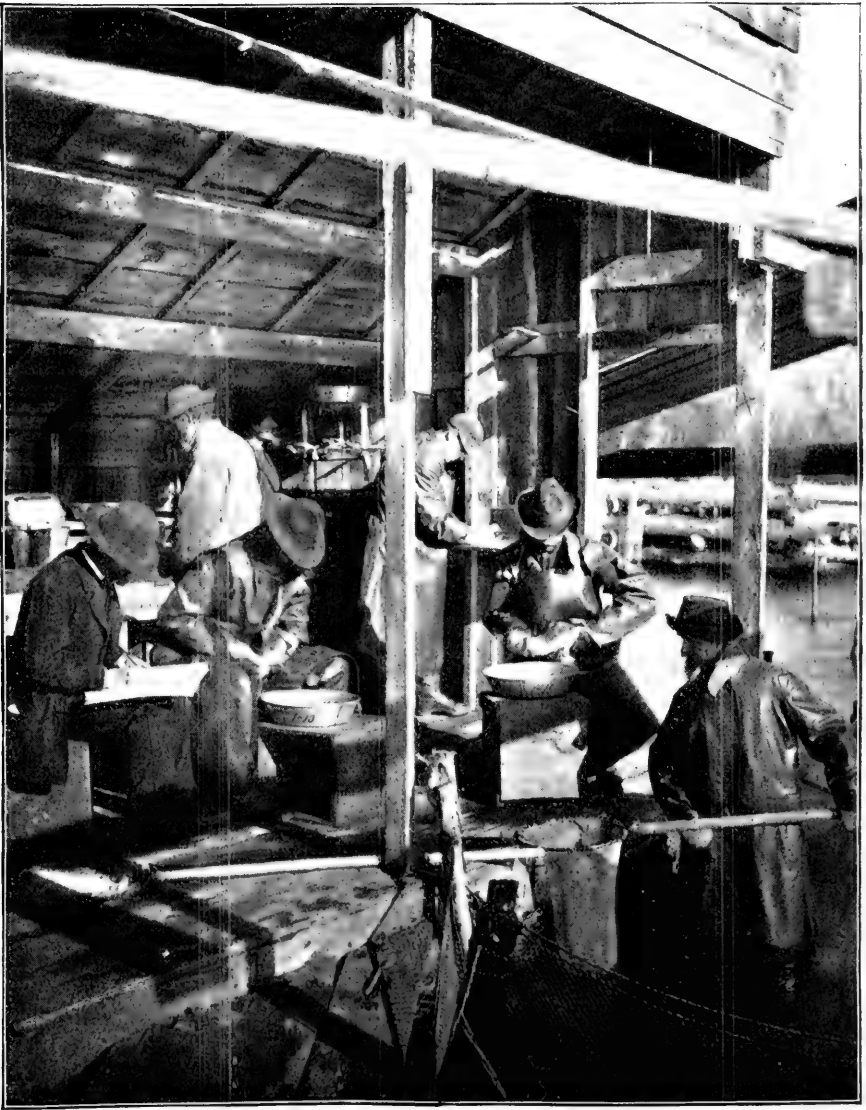
What is the explanation?

If you enter the waters of the Chesapeake from the Atlantic Ocean and proceed up the Bay, you will find running out from the Virginia shores for mile after mile, a vast maze of nets, some extending as far as eight or ten miles toward the center of the Bay. These nets completely honeycomb the favorite path of the shad as they come



A QUICK CATCH.

THIS EXPERIMENTAL CATCH OF COD AND HALIBUT WAS TAKEN IN TWENTY MINUTES ON A NEW "BANK" OFF THE COAST OF ALASKA.



CONSERVATION OF SALMON.

THE SPAWN OF THE LANDLOCKED SALMON IS TAKEN FROM THE FISH AT GRAND LAKE STREAM, MAINE, FOR THE HATCHERIES.

in from the ocean and attempt to proceed up the Bay to spawn. In addition to this maze of line nets, there are thousands of gill and pound nets at frequent intervals in the path of the shad, conveniently placed for his capture and destruction. A few years ago the State of Virginia was licensing only fifteen hundred of these pound nets; two years ago they had increased to about twenty-five hundred; and last year Virginia was licensing four thousand of them.

These nets work twenty-four hours every day in the week, and are the most relentless agency of destruction it has so far been within the ingenuity of man to invent.

It is obvious that if the shad cannot reach the spawning grounds they do not reproduce, hence, must continue to diminish.

The effect of this unrestricted netting is eloquently attested by the decreases in the catches of the fishermen.

For instance, Neitzey Brothers, whose seine at Ferry Landing was referred to heretofore, report that in 1909 they caught 9,000 shad, that in 1912 it was 900, and in 1913 it was 700. Ferry Landing, where this seine was operated, is on the Potomac River but a few miles from Mt. Vernon.

The enormous decline in the total catch of shad in Virginia and Maryland is shown by the following tables:

*Virginia.**—1897, 11,529,474 pounds; 1909, 7,421,864 pounds; 1913, 2,752,321 pounds.

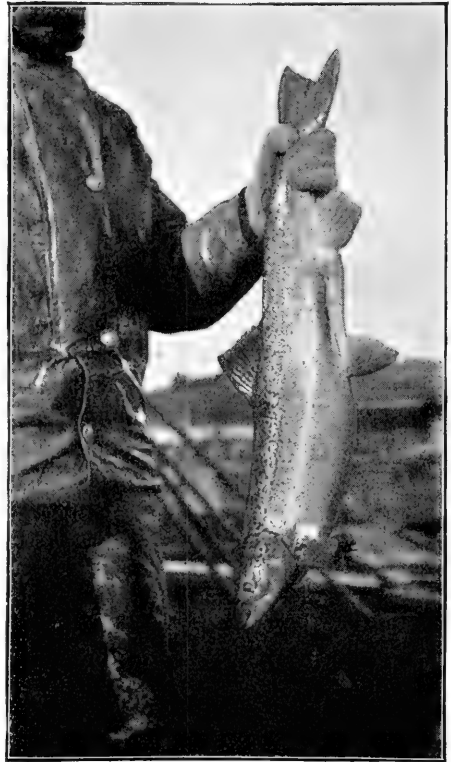
*Maryland.**—1890, 7,127,486 pounds; 1900, 3,111,181 pounds; 1912, 1,912,240 pounds.

In vain has the United States Bureau of Fisheries sounded repeated warnings of the rapidly disappearing shad. In the annual report of the Secretary of Commerce for 1913 appears the following significant statement:

"The immediate cause of the failure of the shad and herring fisheries in 1913 is the diminished run of spawning fish into Chesapeake Bay from the sea and the enormous quantity of apparatus among which a limited catch had to be divided. Inasmuch as the great bulk of the yield is taken in salt water, the remnant that was able to reach the spawning grounds in the streams was insignificant and wholly inadequate to maintain the supply.

"The remote cause of the present condition is excessive fishing in former years and the lack of even the minimum amount of protection that is demanded by regard for the most elementary principles of fishery conservation. Fish entering Chesapeake Bay have to run through such a maze of nets that the wonder is that any are able to reach their spawning grounds and deposit their eggs. The mouth of every important shad and herring stream in the Chesapeake Basin is literally clogged with nets that are set for the special purpose of intercepting every fish, whereas a proper regard for the future welfare of the fisheries and for the needs of the migrating schools would cause the nets to be set so as to insure the escape of a certain proportion of the spawning fish.

"Adequate protection of the fishes is compatible with great freedom of fishery and with a large and increasing yield. A very slight curtailment of the catch, perhaps as little as 10 per cent in any given year, may be sufficient to perpetuate the species and result in increased production in a few years. To disregard a requirement so small and to permit the continuance of an evil so serious simply invites and encourages the destruction of a most valuable food supply."



A FEMALE SALMON.

The present has been a disastrous season to the shad fishery. Hardly a commercial fisherman reports sufficient catch to show a profit, and as a result never as before attention has been directed to the necessity for laws and regulations that will prevent the complete destruction of the shad. The constantly ebbing supply of this fish is reflected in the take of shad eggs at the two principal propagating stations of the Bureau of Fisheries, one located on the Potomac

* From United States Government Report.

and the other on the Susquehanna River.

The figures of these stations for the past three seasons are as follows:

Potomac Fishery.*—1912, 88,727,000; 1913, 30,913,000; 1914, 29,808,000.

Susquehanna Fishery.†—1912, 12,175,000; 1913, 6,861,000; 1914, 2,367,000.

OTHER EVIDENCE.

The same record of unreasoning destruction is reported from nearly every coast State.

The New England States lament the disappearance of their salmon, once taken in abundance on the south side of Cape Cod. In the Connecticut and Merrimac rivers that fish is practically destroyed.

The striped bass has almost entirely disappeared from the rivers of New England, although they were taken in great numbers by the early colonists in that country.

The smelt has become commercially extinct.

Only a few of the shad remain, although that fish was once in such abundance that the Puritans spread them upon their land as fertilizer.

Approximately, the same record is duplicated in the southern coast States.

From the Gulf coast comes a repetition of the same story, the unbridled destruction by man having almost depopulated the waters of their most valuable food fish.

On the Pacific coast we hear the echo of like complaint.

About ten years ago the leaping tuna or horse mackerel, which is one of the most important fishes in Europe in the Mediterranean Sea, was so common during the summer months off Santa Catalina Island, California, that they would be taken by the ton, not only in nets, but on hand lines. The favorite spawning grounds of these fish, as well as those of many other valuable game fishes, was in the kelp in the smooth waters which surround the Santa Catalina and San Clements Islands. As a result of unrestricted netting, they became less year after year, until they were almost destroyed.

The fisheries along the Santa Catalina Islands decreased more than 75 per cent in twenty years, and conditions for a time were seriously menacing to the fish food supply of southern California.



MALE SALMON.

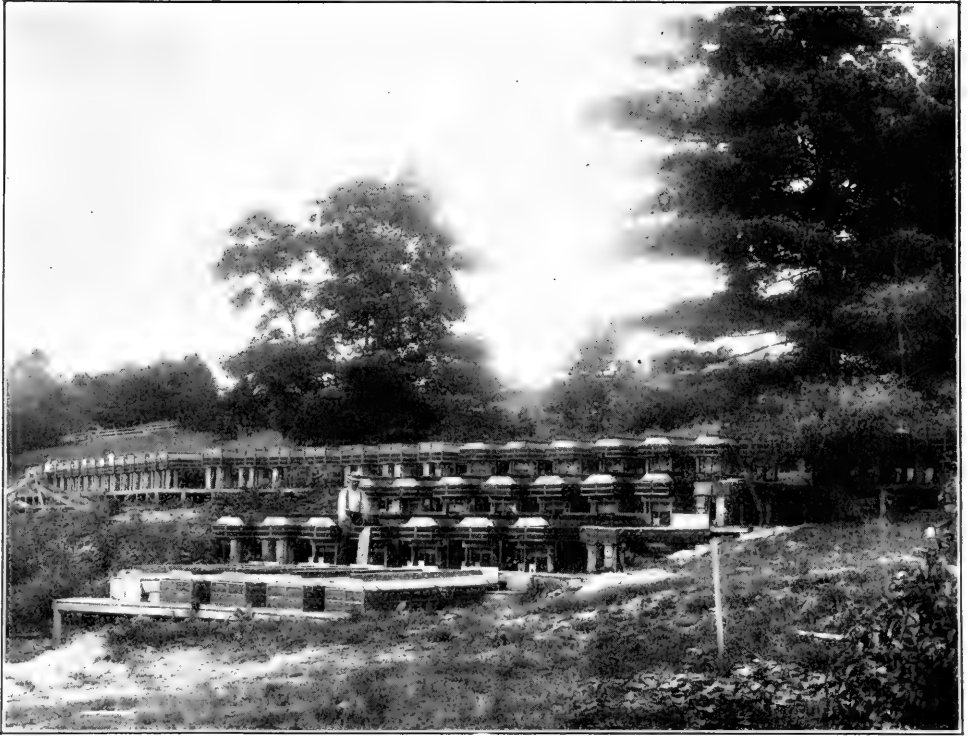
The State of Ohio had from early times permitted net fishing without regulations. A result of the lack of regulations was the placing of nets in Lake Erie for almost interminable distances. One line of nets at Sandusky extended a distance of ten miles from the shore. As a consequence of this indiscriminate net fishing the whitefish, the most valuable fish in Lake Erie, decreased over 80 per cent between 1885 and 1903.

EXTERMINATION OF THE STURGEONS.

No more striking illustration of the profligacy of American fishermen can be found than that of the history of the sturgeons. For many years these large,

* The Potomac Fishery is at Bryan Point, Maryland.

† The Susquehanna Fishery is at Battery Island, below Havre de Grace, Maryland.



OPEN-AIR SALMON-REARING TROUGHS.

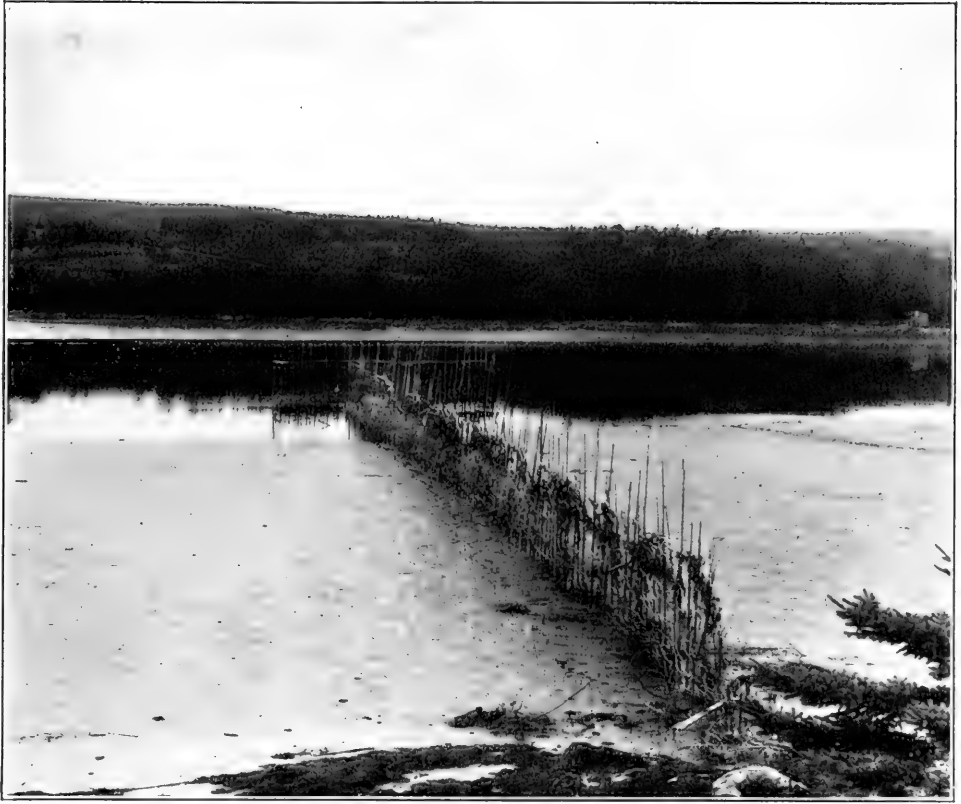
THESE TROUGHS ARE USED AT THE CRAIG BROOK (MAINE) HATCHERY FOR REARING ATLANTIC AND LANDLOCKED SALMON.

inoffensive fishes of our seaboard, coast rivers, and interior waters, were considered not only valueless, but nuisances, and whenever they became entangled in the fishermen's nets were mortally injured and thrown back into the water. According to the statements of Dr. Hugh M. Smith, United States Commissioner of Fish and Fisheries, the shore of the Potomac River in the vicinity of Mt. Vernon was often strewn with their decomposing carcasses, and the same object lesson was witnessed generally everywhere in the country. Finally the fishermen awakened to the fact that the eggs of the sturgeons had value as caviar and that their flesh had value as food. According to Dr. Smith's story, then followed the most reckless, senseless fishing imaginable, and in a comparatively few years the best and most productive waters were depleted, and what should have been made a permanent fishery of great profit was destroyed. Even after the great value of the sturgeons was

appreciated, no adequate steps were taken by the responsible authorities or insisted on by the fishermen, and the fish-eating public remained callous.

For a long time after the failure in the fishery was apparent the immature and unmarketable fish caught in seines, gill nets, and pound nets received no protection whatever in most waters, and were ruthlessly destroyed as nuisances, the decline thus being doubly accelerated.

On the Atlantic Coast the catch of the sturgeon fell from 7,000,000 pounds to less than 1,000,000 pounds in fifteen years; on the Pacific the same meteoric history was enacted, a catch of over 3,000,000 pounds annually in the early nineties being followed by a few hundred thousand pounds in later years of the same decade, with no improvement since that time; while on the Great Lakes the yield declined more than 90 per cent in eighteen years. In the American waters of the Lake of the Woods, one of the most recent grounds



A PENOBSCOT RIVER SALMON WEIR.

Large numbers of these traps are set in the Penobscot during the short season, and they intercept practically the entire run of salmon. The fish thus caught are the sole source of eggs for the hatchery on Craig Brook, a small tributary of the Penobscot.

for the exploitation of the sturgeon, the catch decreased over 96 per cent in ten years, notwithstanding a more active prosecution of the fishing.

FAILURE OF STATE REGULATIONS

The inability of the several States to agree between themselves upon legislation protecting the fish in interstate waters is so well known as to be historic. For public men seeking office through the suffrage of a fishing constituency to lend support to reforms involving the curtailment of any substantial right of the fishermen, has been ever tantamount to their effacement from politics. This unrelenting opposition of the fishermen has caused State Legislatures to ignore the problem entirely or apply only half-way remedies productive of little good.

Should a legislature pass restrictive measures, at the succeeding election it is certain to be vigorously assailed for having "surrendered" the "inalienable rights" of its citizens, or with having confiscated, bartered, or disposed of privileges immemorially enjoyed. It is this deplorable condition, accompanied with petty jealousies, that have rendered it practically impossible for States with jurisdictions covering different sections of the same bodies of water to mutually agree upon constructive legislation. The experience of Maryland and Virginia in the Chesapeake is a notable illustration. This same ignoble and disastrous history has been duplicated with more or less serious results in other States along the Atlantic seaboard, the Gulf of Mexico, and those bordering the Pacific Ocean. As a result, no other great in-



SPAWNTAKING OPERATIONS, BAIRD, CAL.

The fish (chinook salmon) are dipped from the pen, killed by a blow on the head, and passed to the spawntakers. The eggs are taken by opening the abdomen, and the stream of eggs may be seen in the picture following the hand making the incision.

dustry of the nation has suffered more from such baneful effects. It is the irony of fate that this important business, with its tremendous wealth, of steadily increasing economic value to our people, should be doomed to destruction through the fatal indulgence of "its friends."

Those States nearer the seaboard invariably get the lion's share of our marine fishes. For this reason we find the people of New Hampshire complaining against those of Massachusetts; those of Massachusetts inveighing against Connecticut; those of New York muttering against New Jersey; Pennsylvania protesting against Maryland; and Maryland declaiming against Virginia. And the illustration could be extended.

Too often it happens that where reason and common sense have prevailed over opposition to remedial legislation, some invisible influence has intervened

to paralyze the efforts of the officials charged with the enforcement of the laws. Again, when effort has been honestly made to carry out the laws, too frequently their administration has been entrusted by some States to a Fish and Game Department under the control of officials experienced only in protecting inland fish and game—a sportsmen's proposition—but possessing relatively as much knowledge of "marine fisheries" as do the natives of Patagonia of the nebular theory.

It is plain that adequate legislation can never come from legislative bodies thus deterred from fearlessly enacting into law their honest convictions. Obviously, what is required for intelligent solution of the situation is the strong, guiding hand of the Federal Government—for legislation springing from sources freed from all personal influences, personal friendships and exterior considerations.

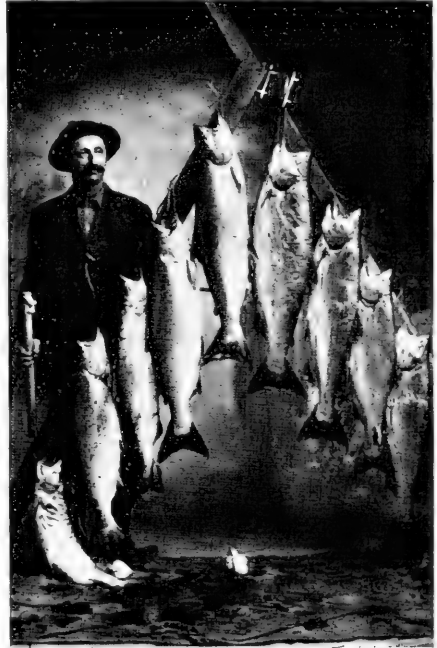
Other countries have been forced, by like conditions, to meet the same issue. Cannot we profit by their experience of centuries? England, France, Holland, Germany, Norway, Denmark and Sweden, in each of which countries every small principality, every county and shire, having its ancient special fisheries rights, grants and charters, were forced to reach a mutual understanding in order to save the fisheries of the North Sea and the Channel from absolute destruction. In the Mediterranean, like conditions forced joint action and control.

RIVER POLLUTION.

Another cause of the diminution of our marine fisheries is the practice prevalent in this country of permitting our cities to dump their sewage and seepage into the waters of our bays and rivers. Not alone do we expose the health and lives of millions of our citizens to the ravages of disease and contagion through scattering broadcast the germs which such refuse often contains, but in numerous instances this refuse has contaminated the waters to such an extent as to deprive them of their normal proportion of oxygen, rendering it impossible for the fish to ascend them to their spawning beds, except under conditions rarely present.

A few of our cities already have partly established sewage disposal plants, and others now have them under construction. Our Federal Government should be foremost in setting a commendable example in this respect. Even at this late day, the boasted capital of our nation possesses no sewage plant but floods its sewage into the Potomac, whence it is carried down stream to the infection, distress, and injury, of the marine life inhabiting those waters. Plans for a sewage disposal plant for Washington are now under consideration and more active steps in that direction will be taken in the near future. At Annapolis, the United States Naval Academy dumps its sewage into the Severn. It is to be hoped that the Naval Academy will be provided with a

sewage disposal plant of its own at an early day, and that some means may be found by which every city in our country that now casts its waste upon flowing streams may be influenced as speedily as possible to adopt those hygienic methods of disposition evolved by modern engineering science and skill.



WHERE KING SALMON HIT THE TROLL.

In the New England States many streams flowing adjacent to villages, towns, and cities engaged in manufacturing, become the depositories of the seepage of the manufacturing plants. The aggregate result of this inflow is the contamination of the stream, denuding it of its life-giving properties and rendering it uninhabitable by the fish. So filthy have some of these streams become as a result of this practice that their waters are unfit to bathe in.*

The practice of dumping the sewage of our cities into our bays and rivers has not alone resulted in loss through the damage done the marine life inhabiting the waters thus defiled, but at the same time we have wasted a tremendous

* Testimony of Hon. Wm. S. Greene, of Massachusetts, before House Committee on Merchant Marine and Fisheries.

quantity of nitrogenous material that should go back on the land. In the older countries—Germany, for instance—this problem has been handled much more intelligently. In Germany they turn the sewage back on the land and lease the land, charging about thirty dollars an acre to the farmers for it. Should we adopt some similar method, we would be checking a loss on the one hand and at the same time converting waste material into a profit. The loudest demands of our agricultural population is for good fertilizer procurable at a reasonable price, and yet we have been sacrificing the very best fertilizer through the stupidity which has characterized our handling of this one phase of a most important municipal problem.

THE ECONOMIC EFFECT

What is the economic effect of our shortsighted, wasteful and extravagant policy?

Market fish are decreasing in quantity and quality in an inverse ratio to the increase of our population, and their prices steadily increasing. The fish industry in the majority of the coast States is being forced to headlong destruction.* In but a few years, if present conditions continue, the price of many of our market fish will be beyond the reach of that class of people on

whose table they are now most frequently seen.

The accompanying schedule shows the increase or decline in the catch, the increase or decline in the wholesale price, and the approximate increase or decline in the retail price covering the period between 1880 and 1908, of our most popular market fish:

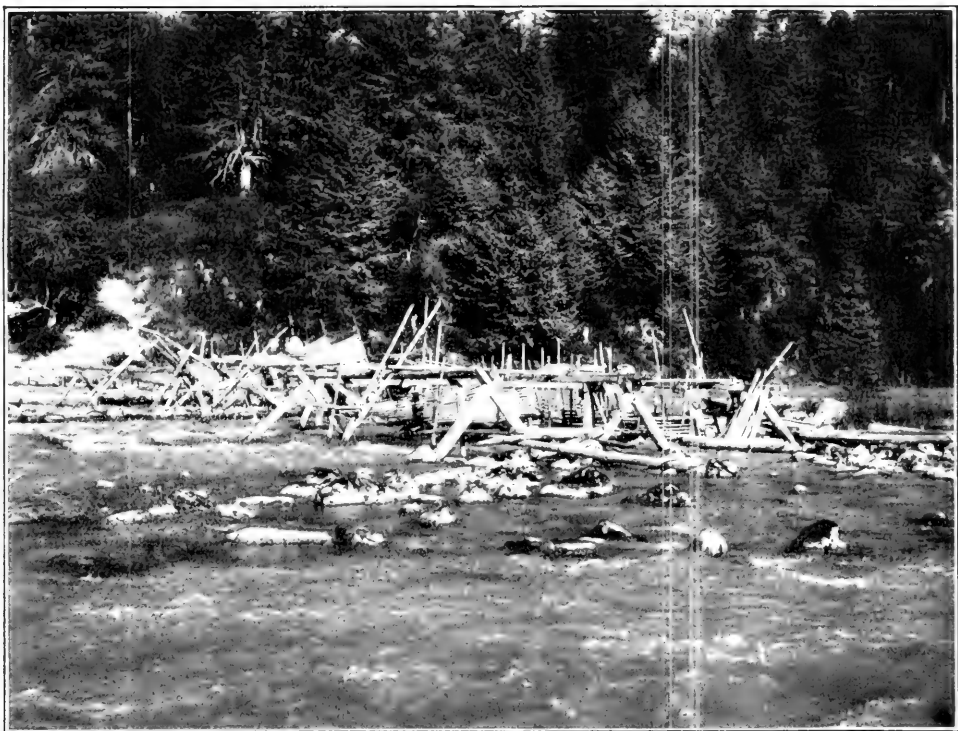
Some idea may be gained of the aggregate cost to the American people of our improvident policy toward this valuable national asset when one pauses to reflect that the total Catholic population of the United States is in the neighborhood of twenty million, and that the practice of the great majority of these people in confining their meat diet on Friday to fish has caused marine food to become the favorite dish on that day of a large Protestant population. What this increase in the price of fish means to these millions of consumers is merely a matter of mathematical calculation. If this cost is estimated, the figures in dollars and cents will prove such as will be apt to startle even the most lethargic.

And let us not overlook that the penalty we are now paying is but insignificant in comparison with that which will confront us in the future unless some radical change is inaugurated.

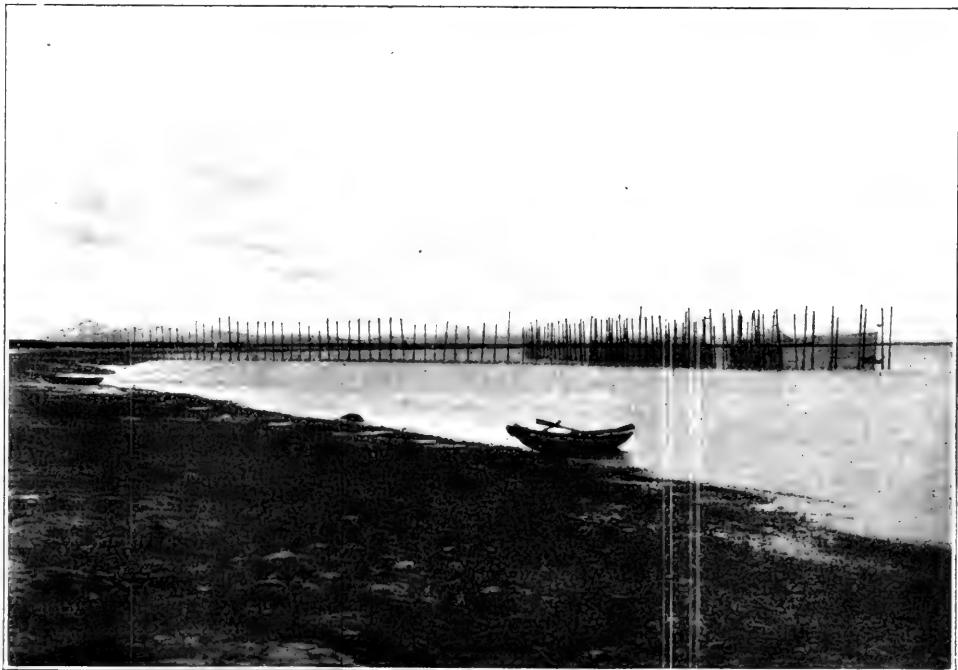
	Catch	Wholesale Price	Retail Price
Bluefish.....	— 56%	+ 35%	+ 40 to 65%
Cod.....	— 8%	+ 5%	+ 60 to 100%
Flounders.....	+360%	— 15%	+ 10 to 25%
Haddock.....	+ 32%	+ 52%	+ 55 to 65%
Halibut (Atlantic Ocean).....	— 65%	+ 25%	} + 25 to 45%
“ (Pacific Ocean).....	+230%	+ 50%	
Mackerel.....	— 25%	+ 10%	+100 to 150%
Menhaden.....	— 30%	+ 20%	+ 30 to 45%
Pollak.....	+380%	+ 30%	+ 35 to 50%
Salmon (New England).....	—900%	+900%	+300 to 500%
“ (Pacific Ocean).....	+ 85%	— 15%	+ 20 to 30%
Shad.....	— 80%	+120%	+175 to 300%
Sturgeon (Atlantic Ocean—1891 to 1908).....	—660%	+360%	+ 500 to 600%
Weakfish.....	+280%	+ 5%	+ 50 to 100%

+ Indicates increase.
— Indicates decrease.

* While writing this article I am in receipt of a letter from Mr. Joseph Crawford, of the *Newark Star*, Newark, N. J., who says:
“Thousands of tons of fish have been destroyed along our coast this summer because they were too small for market and great quantities of ling and whiting have been destroyed to keep them out of the market. The fish that hold best in cold storage, that is, blue fish and weakfish, are so scarce the net men are even becoming worried.”



ALASKAN FISH TRAPS AND RUNS USED BY NATIVES ON CHILKOOT STREAM FOR OBTAINING THEIR WINTER SUPPLY OF SALMON.



SALMON TRAP IN AN ALASKAN RIVER.

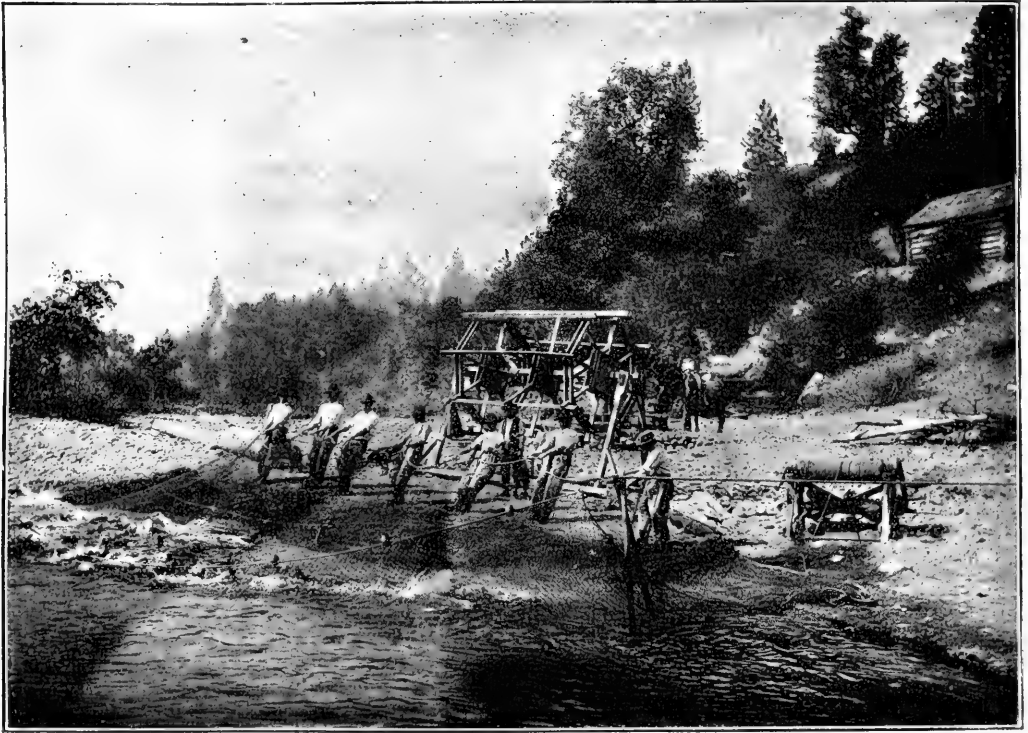
This form of trap is extensively used in the Bristol Bay region, and takes immense quantities of salmon for the canneries. The largest traps have leaders more than half a mile long, and cost upward of \$15,000.

NATIONAL PROTECTION

We have been witnesses to the necessity for national legislation protecting our forests, our coal fields, our waterfalls, and our migratory birds. These valuable assets of the nation were being rapidly acquired by a fortunate few who were turning them to their own personal profit at the expense of those who had lagged in their protection. It has ever been true that what is every man's property belongs to him who gets it. And when those acquisitively inclined are struggling for their own personal advantage, we have found

and are not the property of any one State. Nor should the people of any one commonwealth enjoy the unrestricted privilege to destroy them. Much less should a few people on our seaboard, near the mouth of those bodies of water which these fish enter, who by reason of their location are in places convenient to wage a warfare of destruction, have the right to selfishly and inequitably preempt this wealth of the sea to the deprivation and loss of those situated inland on these same bodies of water.

But this is identically what the fish-



CATCHING SALMON BY THE THOUSAND.

SEINING SPAWNING SALMON ON THE M'CLOUD RIVER, CALIFORNIA, AT THE BAIRD STATION. STEAM POWER HAS NOW REPLACED THE HAND WINDLASS.

that the rights of the majority are usually overlooked.

Our marine fishes such as the herring, the shad, the tuna, the sturgeon, the salmon, etc., are migratory fishes. They enter our bays, rivers and interior waters for the purpose of spawning, and after having performed that important function, return to the ocean. They do not remain permanently in one State

ing population of many of our coast States is doing!

We have ever crowned the heights of infamy with the figure of him who filches from the poor. Our food fish are the food par excellence of the poor. What expression then shall we use to characterize the laxity which is resulting in the dissipation of this immensely valuable food resource?

The experience we have had in obtaining that fish-protection legislation we have been fortunate enough to secure from the legislatures of the several coast States, plainly indicates that long before these States have agreed upon uniform laws, the fish will be no more. The situation is one which, in the opinion of many, is critical, and imperatively requires the attention of our National Government. To delay longer in treating it as a national problem, and to fail to apply a remedy from a national viewpoint, presages the sacrifice of what is left of our fisheries.

Acting from this viewpoint, during the first session of the 63d Congress, I

eries, whose Bureau is a portion of the Department of Commerce, regulations governing netting, seining, and the seasons for taking, framed to suit the particular requirements of each body of water, can be formulated. The judicious application of conservative methods will cause the fish to multiply, and restore to a flourishing condition the fishery business, whose present chaotic condition, due to lack of sane regulation, is forcing it to inevitable destruction, to the injury of the whole fish-consuming public.

Then, too, let us not overlook that we of the present generation are the trustees of the wealth of the waters which



KING SALMON GOING UPSTREAM TO SPAWNING GROUNDS.

introduced in the House of Representatives two measures:

The first, H. R. 7774, is designed to restrict the shipment in interstate commerce of fertilizer or oil composed in whole or in part of food fish.

The second, H. R. 7775, places all fish that do not remain the entire year within the waters of any State or territory under the protection of the Government of the United States and authorizes the Department of Commerce to define the seasons and regulate the manner and conditions under which they may be taken or destroyed.

If these measures are enacted into law the use of food fish in the manufacture of oil or fertilizer will be effectually discouraged. Under the direction of the Commissioner of Fish and Fish-

Nature has so bountifully given. It is our privilege to use what we require for our own sustenance and comfort, but when we dissipate this gift through profligacy and extravagance we rob those yet unborn of their birthright. Our holding may be likened to that of the *cestui que trust*. If our use becomes an abuse, resulting in the wasting of this estate, our wrongdoing will serve only to cast upon our memory that reproach which we deserve. In our present treatment of our food fish we are not only squandering a valuable national asset, the part destruction of which has already entailed financial loss upon ourselves, but we are destroying a food supply the effects of which upon the living problem of the future it is impossible to estimate.



Photo by H. R. Francis.

WEST 130TH STREET LOOKING FROM FIFTH AVENUE.

There are many trees in poor condition among this planting, but the improvement brought about by the presence of the trees is something that should be duplicated on streets wherever it is possible to plant and maintain trees.

NEW YORK CITY'S TREES

TREES planted on city streets are surrounded by unnatural conditions and the struggle for existence is therefore intense, while in most cities it is made worse by improper care, lack of systematic and skillful management and by too small an appropriation for the department which should have control of the tree work. New York City, like many other cities, is in need of a bureau of tree culture, and as a result of a recent cooperative study of tree and street conditions there by the Tree Planting Association of New York City and the New York State College of Forestry, at Syracuse, which assigned Prof. H. R. Francis to the work, a plan has been suggested which may be adopted by New York, and which will furnish to other cities an idea of how such a bureau should be established and conducted and what it will mean to a city.

Up to the year 1902 in New York City, when for the first time the trees were placed under the exclusive con-

trol of the Park Department, trees were planted by private property owners, real estate promoters, civic improvement associations, etc., without consideration of the future beauty of the city as a unit. This is invariably the case where public improvement of any kind is made in a haphazard manner without the intelligence and foresight of expert supervision. Consequently, there were many causes for tree planting, all varying in motive and therefore in attainment. The result is that the city has thousands of trees that were planted without regard to uniformity and were not adapted to local conditions. Many of them also were of short-lived varieties, bringing about conditions that were altogether unsatisfactory and unnecessarily expensive to maintain. Furthermore, these unsystematic and irregular efforts have resulted in the complete denudation of large areas since trees have been removed continually and none planted in replacement.

About all the city can boast of now is the possession of thousands of trees unsightly in appearance, some of which are dangerous to the public on account of their weakened condition and are an expensive instead of a valuable asset. Had there been established a bureau to control tree planting and preservation, the work would have been done systematically, scientifically, and, above all, economically. The city today would possess an asset the value of which it is impossible to estimate, as it is an ever-increasing one.

The beauty and sanitary value of the trees rightly planted would have been universally noticeable, and the present expensive care of the trees would have been eliminated. The fact that the trees planted on the streets since 1902 present no better features than the conditions of those planted before shows that a continuation of present methods is but a guarantee to the city of the same burden of expense in the future. The economy of a bureau for the control of tree culture is therefore one of the greatest reasons for its existence.

BUREAU OF TREE CULTURE

A bureau of tree culture should be established under the Department of Parks and should, in the case of New York City, consist of a forester for each borough, so says the recent report to the Park Commission. The supervision and direction of all features connected with tree and plant culture of each borough should be under the control of the forester for that borough, who should work under the direction and approval of the Park Commissioner. The work of each forester should generally be independent of the work of the other foresters. The yearly salary of the foresters should be \$1,800 minimum and \$4,000 maximum. The position should be filled by civil service examinations of the applicants. Each forester should be a man of scientific training along lines of tree culture, including Forestry, Horticulture, Dendrology, Plant Pathology, Entomology and Landscape Gardening. He should have had at least three years of practical experience in city forestry.

DUTIES OF A FORESTER

A forester should begin the collection of data for a tree census of his borough. This would be a complete inventory of the state of work regarding the trees and the opportunities for future work. As soon as any work is



Photo by H. R. Francis.

A WOUND IN THE TRUNK OF AN ELM TREE.

Probably 90 per cent of the fine old Elms along Seventh Avenue on Manhattan have wounds similar to the one here illustrated. This condition could have been prevented by protecting the trees at the opportune time. It is far more economical to prevent such wounds which invite disease and decay than to resort to methods of tree repair which in most cases proves wholly unsatisfactory.

done upon trees or plants it should be noted on the census. In other words, the tree census would be a condensed statement of all the information regarding the trees.

He should specify the material for a municipal nursery. This is very important since the training and experience of the forester would enable him to specify the varieties of trees that would be best adapted for the work which he has in mind. The selection of trees adapted to city conditions is a very important question since the expense of future care depends to a great extent on this.

The forester should also outline general culture methods for trees already established, methods which would tend toward a permanent development in a systematic manner at a minimum expense. On account of his direct contact with the details of his work, he would know the physical condition of the trees and would, therefore, be the one to pass judgment on all trees as to their health, safety and variety. He should be in touch with the workings of the engineering department of his borough in so far as the matter of future streets is concerned; he should consult with this department so that provisions will be made at the outset for the planting and future development of trees. This is a very important feature and one that would tend not only to lower expense of future care and maintenance of trees but would also bring about the greatest opportunity for planting trees in a systematic way. It would also mean the requirements of trees which, given the proper consideration, would be much more economical and satisfactory than the adapting of trees to severe existing conditions.

The forester should select equipment and materials for his department. On account of his experience he would know the equipment of tools with which his men could work to the best advantage and which would be the most economical for the city. The matter of materials is important.

The forester should act in an advisory capacity in regard to damages to

trees. Some trees are cared for by private organizations or associations, and the forester should have supervision of such work.



Photo by H. R. Francis.

BUTCHERED TREES.

Throughout all the boroughs of New York City there are many trees that have been butchered. Trees that have been pruned in this character are so unsightly as to disfigure rather than beautify the street on which they are planted. While this method of treatment may have been applied in anticipation of saving the trees they should not have been neglected so long as to make this severe action necessary.

When trees are planted by contract the forester should act in a professional capacity. That is, he should handle the specifications and keep in close touch with the details of the work being done by contract. In brief, the duties of a forester should be advisory as well as having general supervision over the city's vegetation.

The Superintendent of Parks should hire the workmen that do the actual

work in the Forestry Department. By keeping in close touch with the Superintendent of Parks the Forester could lay out his work in advance and ar-

course, would work in harmony with the Superintendent of Parks.

The Forester should see that the proper soil for the trees specified by



Photo by H. R. Francis.

BASE OF AMERICAN ELM TREE BADLY DAMAGED BY TRAFFIC.

The root system of this tree requires a considerable area immediately around the base of the tree to send out undisturbed its spreading roots near the surface of the soil. This protection may be furnished by surrounding the base of the tree with an iron grating.



Photo by H. R. Francis.

A GOOD STAND OF FINE OLD ELMS LOOKING UP SEVENTH AVE., FROM NEAR WEST 117TH STREET, NEW YORK CITY.

It is impossible to estimate the beneficial effect created by the presence of these trees in a part of the city where the amount of vegetation is extremely small. This is in addition to the slightly appearance of the street. Many of the trees are surrounded at the present time with pavements leaving a small opening only directly around the base of the tree. It would be much more advantageous to the growth of the trees to have an open grass space for every tree similar to the space enclosed by the iron railing shown in the foreground of the photograph.

the Landscape Architect is furnished and that all conditions are made most satisfactory for the development of the trees and plant specified by the Landscape Architect for the formation of his composition. The Forester should also be able to prepare planting plan details to supplement the Landscape Architect's plan.

The office force should be as limited as possible so that the money appropri-

range with the Superintendent for the required number of men. This is rather important since the political phases that enter into all city work would be removed from the Forester. He, of



Photo by H. R. Francis.

A CEMENTED CAVITY IN AN ELM TREE.

A considerable amount of tree repair work similar to this shown in the photograph has been done on the trees along Seventh Avenue on Manhattan. A careful examination of the work shows that it has not been properly done and a large amount of money has been expended without bringing about the desired results.

ated shall go into actual care and maintenance of trees and not to the creation of office positions. In the field there should be working under the Forester's direction a sufficient number of arboriculturists to handle the different branches of the work of this department. For instance, in Brooklyn, there is at the present time an arboriculturist for the parks and two for the streets of the city. These three arboriculturists in this case should be under the direction of the Forester, who could coordinate and direct their work to bring about the maximum results of their efforts. The arboriculturist should be a man filling his position through civil service examination, and while his knowledge and experience are not necessarily as broad as that of the Forester, it should, however, be along similar lines so that the arboriculturist may work in harmony with the Forester and intelligently execute the details of his position. Under the arboriculturist would be the foreman and the workmen. It is a general custom to differentiate the work of the laborers. For instance, those who do pruning which requires a considerable amount of climbing and those who carry on spraying which requires some knowledge of spray materials and mixing.

The Forester should be able to give effectively instructional lectures regarding the work. One very important feature in connection with tree work in our cities is the education of the people not only as to the beauty but as to benefits from planting of trees in a city.

The functions of the Bureau of Tree Culture in the Park Commission would be to serve as a connecting link between the Foresters of each borough, who should come together for periodical meetings where broad questions that affect the general welfare of the trees of the city as a whole should be discussed. Features connected with the work of each man's borough could be discussed profitably, and the experience of all the Foresters could be brought to bear on the problems that come up in



Photo by H. R. Francis.

ORIENTAL SYCAMORES ON VANDERBILT AVE., STATEN ISLAND.

These trees have been planted about twenty years. They require very little attention either in the matter of pruning or the attacks of the serious pests that prey on many shade trees. Aside from the well distributed foliage displayed during the summer months which makes the tree desirable for shade purposes is the striking appearance presented by the tree during the winter with its white bark and its pendulous ball-shaped fruit.



Photo by H. R. Francis.

BROAD STREET, STAPLETON, STATEN ISLAND.

An example of a semi-business street where few trees have been planted, but where there is a great opportunity for planting trees. Streets with such a width as illustrated in this photograph offer opportunities for planting trees at a small expenditure of money or labor.



Photo by H. R. Francis.

A STREET PLANTED WITH TREES OF UNDESIRABLE VARIETIES WHICH ARE NOT UNIFORM IN SIZE, IN DISTANCE OF SPACING AND IN DIFFERENT HABITS OF GROWTH.

This is the result accompanying individual effort in street tree planting where each property owner plants a tree without due consideration as to the value of a tree as a unit in the planting scheme of the street as a whole.

connection with the work in each For-
ester's department.

A MUNICIPAL NURSERY

A municipal nursery, which should be established where soil and location would be most advantageous, should be under the control of the bureau as a whole. One municipal nursery could easily serve all the boroughs. This municipal nursery could be put in the charge of a trained arboriculturist with special experience in nursery work. A nursery of about 100 acres would serve the purpose of supplying trees for the forestry work of the entire city.

THE QUESTION OF COST

The initial cost of planting trees on city streets should be borne by the owners of property along that street, which is the same method used for other street improvements. The care and maintenance of trees should be borne

by the general tax. Trees planted after the Bureau of Tree Culture has been formed should be guaranteed for life as long as the street remains in condition to warrant growth of trees. Trees other than those planted after the Bureau has been established and those that are in condition necessitating removal should be taken out at the expense of the property owner. Property owners should be responsible for injuries due to falling of trees, etc. When trees are removed for other reasons than their dangerous condition, for instance, killing of trees by gas, the tree being in a firm and safe condition for several years thereafter, a permit should be granted for its removal upon the deposit of a sum sufficient to plant a new tree at or near the old location. This would mean that the gas company, for instance, would be responsible for the replacement of a new, live tree.

COMBINE AGAINST FIRES.

COOPERATIVE agreements involving the Forest Service, the State of Montana, and the Northern Pacific Railroad have just been renewed so that they will extend through the fiscal year ending June 30, 1915.

The agreement with the State of Montana provides that Federal and State patrolment shall cooperate to form one single force for handling forest fires. This force, in any locality, acts under the direction of the forest supervisor in charge of the nearest national forest. This arrangement is entered into, according to the agreement, so as "to secure the greatest efficiency and avoid duplication of patrol." The agreement applies to all Government and State lands lying within the exterior boundaries of the national forests in Montana.

The number of patrolmen supplied by the State is in proportion to the acreage of State land within each national forest. No patrolman receives less than a certain minimum wage and appointments by the State must be approved by the district forester. State patrolmen are made Federal "forest guards," and are employed particularly during the four months deemed by the district forester to be the ones most likely to have forest fires.

All lands within the various forests are thus patrolled against fire. The agreement provides that each patrolman, Federal and State, "shall keep vigilant lookout for forest fires and shall make every possible effort to extinguish them whether on lands belonging to the State or to the Government or on lands adjacent thereto where the fire threatens such lands."

Besides the State and other lands, there are scattered through the national forests in Montana many tracts, usually in alternate sections, owned or claimed by the Northern Pacific Railroad. The agreement between this railroad and the Forest Service provides for the same kind of cooperative patrol that exists between the Government and the State of Montana.

A third agreement, a continuing one, provides for cooperation between the Forest Service and the State under the so-called Weeks Law for protecting State and private lands on the watersheds of navigable streams. The Government allots the State the sum of \$3,500 a year, which is expended for the salaries of Federal patrolmen, and the State agrees to expend at least an equal amount for fire protection purposes of any character.





MT. LASSEN IN ERUPTION.

A FOREST FIRE LOOKOUT STATION ON TOP OF THIS MOUNTAIN IN CALIFORNIA WAS DESTROYED DURING THE RECENT ACTIVITY OF THE VOLCANO.

THE LOOKOUT ON MOUNT LASSEN

By WILLIAM C. HODGE

THE forest fire lookout house on Mount Lassen was destroyed by the eruption of June 12th.

After the first eruption, which occurred May 30th, the summit was pick scaled by Ranger Harvey Abbey of the Lassen National Forest, who left Mineral at 4 p. m. May 31, and arrived on top next morning at 9 a. m. He found the house unharmed. The crater from which the explosions were issuing was situated about a quarter mile from the lookout house; but the crater at

this time was small, measuring only 25 x 40 feet and the eruptions, although spectacular, were not yet considered dangerous.

On June 12th, after eruptions had occurred on June 1st, 2nd, 8th and 9th, Abbey made another ascent with a party which included a moving picture outfit.

One of the party suffered from fatigue, being unused to mountain climbing, and in consequence they took considerable time. At 3.45 p. m., while



— DURING THE HEIGHT OF THE ERUPTION.

OWING TO THE FALL OF STONES AND ASHES IT WAS UNSAFE TO GO MUCH NEARER TO THE MOUNTAIN THAN ARE THESE SPECTATORS. THE SKY FOR DAYS WAS FILLED WITH MASSES OF SMOKE CLOUDS SUCH AS ARE SEEN HERE.



THE LOOKOUT STATION.

There was not a single part of this station which could not be carried by a man, and all of it was transported to the peak by men. Instead of windows it had a ribbon of glass around it, affording an uninterrupted view to the man inside.



BEFORE THE ERUPTION.

A VIEW OF THE PEAK FROM CLOSE QUARTERS A FEW WEEKS BEFORE THE INTERNAL ACTIVITIES MADE THIS GROUND HAZARDOUS.

they were still half a mile from the peak, a terrific explosion occurred and they had to run to escape the shower of stones.

This eruption was brief and Abbey resolved to take another chance, which he did. He found the crater greatly enlarged and the roof of the lookout house punctured with rocks. One had fallen upon a rafter but instead of smashing things it had merely sliced its way through the timber.

The explosion of June 14th seriously injured two sightseers who were caught in the rain of rocks.

Eruptions still continued at intervals and the peak is regarded as unsafe for visitors and untenable as a lookout.

The lookout cabin on Mount Lassen was one of the most interesting in California even before its destruction.

It was carefully designed by former Supervisor Kling. No one part was larger or heavier than could be packed on a man's back and by an ingenious

method of joints the house when set up in the shop in Red Bluff was as stable and rigid as a fort and the house was then taken apart and the pieces transported as far as possible up the mountain by wagon. The pack horses were used as far as they could go; finally giving way to the most primitive means of transportation—men's backs.

The house was 14' x 14' and was provided with every appliance needed by the lookout man in the performance of his duties. Instead of one or few windows, it had a ribbon of glass extending clear around the building, affording a practically uninterrupted view for the man inside.

Forest Supervisor Rushing has taken steps to equip for lookout purposes another peak in lieu of Lassen. The point is Brokeoff Mountain, a few miles distant.

At last accounts the crater measured 600 feet by 150. No flames or lava have been seen at any time.

ARREST FIRE LAW VIOLATORS

TWO convictions in Washington for burning slash without permit from a fire warden, damage amounting to perhaps \$5,000 to logs and logging equipment in the same State through fires in slashings, but no loss of green timber, is the Pacific Northwest record for June, the first month of the 1914 forest fire season, according to bulletins received from several States by the Western Forestry and Conservation Association.

All protective agencies were placed on the alert at the close of June by the prospect of a drying interior wind, but the new forecast service especially for forest fire conditions which is supplied by the United States Weather Bureau soon reassured them that the threatening high pressure in western Canada had split into two areas and the danger was for a time averted. Nevertheless, all patrol forces are being rapidly recruited for the season and about 2,000

men will be on duty in a few days in Oregon, Washington, Idaho and Montana. About 500 patrolmen are employed in these States by the timber owners' protective associations, nearly 200 by the States and the Government jointly outside the national forests, and the others by the Forest Service within the national forests. The British Columbia Government also has 225 men on duty.

July hazard to be guarded against, other than from camp fires, was chiefly in slash burning to clear land and rights of way and in leaving fires thus started to smoulder in logs and stumps to break out later when the inevitable hot and windy weather arrives. Forest officers announce that State laws regarding burning without permit and precaution will be enforced rigidly and also warn summer camping parties to be extremely careful with camp fires.



SUGAR CANE SIXTEEN FEET HIGH.

THE WRITER AND HIS HORSE ON LAND BUT RECENTLY PLANTED TO SUGAR CANE IN CAMAGUAY PROVINCE, CUBA.

CRUISING IN CUBA

By E. V. PRESTON

I RECENTLY spent some time in examining a tract of timber in Camaguay Province, Cuba. To reach this tract we were obliged to leave the railroad and travel by horseback for a distance of forty miles. This part of the trip led us over a level country which for the first five miles was largely planted in cane fields and grapefruit groves. After that the country became wild, with settlements miles apart and no roads except cart trails through the woods. The timber was all small and of little value except for railroad ties and fence posts. The underbrush and vines were so thick that we

could not go through without cutting a way with a machette.

The royal palm also grows plentifully on these lands. The natives use this tree for building their houses, the leaves for roof and sides, and the woody shell of the trunk split up into strips for the frame. These trees bear bunches of seed every month, and hogs are fond of them. A native Cuban told me that four or five trees would supply seed enough to raise and fatten one hog. The natives also find the tree serviceable for making bee hives, using a section of the outside shell about 30" long. The inside of the trunks of the palms



FAMILY OF NATIVE CUBANS.

WITH THIS FAMILY THE WRITER AND HIS TWO GUIDES STAYED ONE NIGHT WHILE LOOKING OVER A TIMBER TRACT IN CAMAQUAY PROVINCE, CUBA.

are pithy and soft and easily removed, leaving the hard, woody shell. The honey business is very large among the natives, many having several hundred swarms.

Arriving at the tract of timber we sought, which contained 640 Caballarias (a caballaria is $33 \frac{1}{3}$ acres), we found a much better class and stand of timber than any we saw on the journey. The royal palms grew thickly and the underbrush and vines had to be cut away before we could leave the cart trails to go into the timber.

The different species of hardwood timber found on these lands are Acano, Spanish Cedar, Ocuje (pronounced O-coo-he), Mahoganv, Jique (He-kev), Guaymaro, Jucaro (Hoo-cay-ro), Saba-

cu, Majagua (Mah-hah-gwa), Morura, Cuban Oak and a species of Rosewood and Ebony.

The Acano trees grow to a large size, the wood is hard and very beautiful, resembling Rosewood. The Morura is used for cart hubs. Jique is durable and never decays. Jucaro is dark colored wood used for cart spokes. Sabacu is used for cart felloes and counter tops. Ocuje is used for furniture. Majagua is used for furniture, cart tongues, etc. All of these species run from 16 inches in diameter at the stump to 48 inches and from 20 feet to 48 feet to the limbs. The Mahoganv and Cedar run from 18 inches in diameter up, but are mostly short bodies from 20 to 30 feet long. The Ebony



ANOTHER CUBAN FAMILY.

One of the guides of the writer was the proud father of this representative Cuban family of nineteen children. The family home is thirty miles from the railroad in the northern part of Camagney Province, Cuba.

is small, from 8 to 12 inches in diameter and short bodied.

These lands will cut from 2,500 feet to 5,000 feet per acre of good saw logs of the different varieties. There is also quite a quantity of tie timber and fence post timber. At least 60 per cent of the standing timber is Ocuje, the balance about equally divided among the other varieties.

I saw where large Mahogany and Cedar had been cut and hewn on these lands, I should judge more than 100 years ago. This timber must have been hauled to the seashore, which is twelve or fifteen miles to the north. Most of this tract of land is level and fertile, part of the tract, however, is on a mountain side probably 2,000 feet high.

The Jaguay and Coupey trees first grow like a thin vine clinging to some large tree. This vine grows to the top

of the tree, then proceeds to put out laterals around the tree it clings to and finally kills it. By this time it has grown all around the dead tree and has formed itself into a perfect forest tree, sometimes four feet in diameter. The wood is soft and useless.

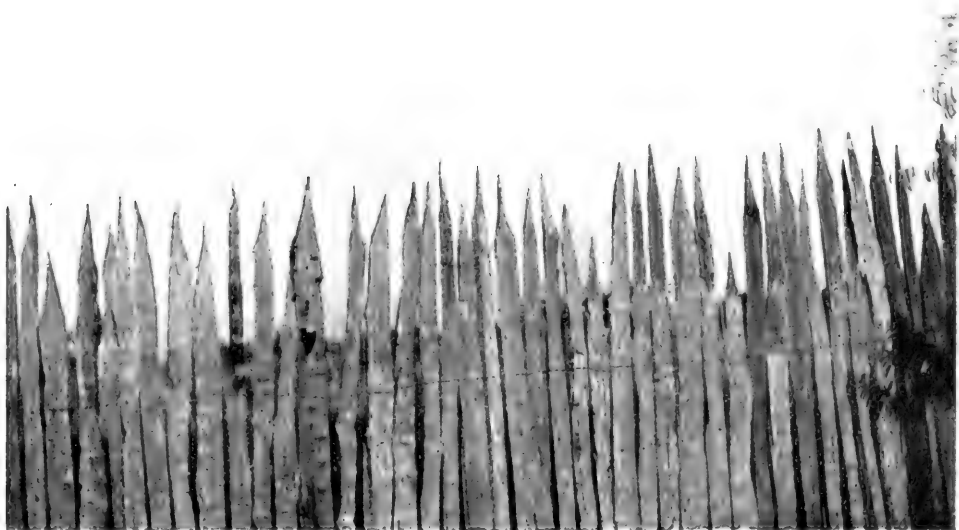
Three varieties of trees are used largely for fence posts—the Almasaca, Cienella and Jobo. All of these posts when stuck in the ground as fence posts take root and branch out into trees. And it is a common sight to see wire fences with growing posts.

Taking them as a whole, the woods of Cuba are wonderful. Their lasting qualities are remarkable. Some varieties seemingly never decay. I saw Jucaro and Jique wood in an exposed place in Moro Castle, Havana, said to have been there over 300 years, that was sound, apparently, as ever.



A SMALLER FAMILY.

THE TWO GUIDES OF THE WRITER AND THE FAMILY OF ONE OF THEM AT THEIR HOME IN CAMAGUAY PROVINCE, CUBA.



TIQUI WOOD FENCE.

THIS FENCE IN CAMAGUAY PROVINCE, CUBA, IS OVER ONE HUNDRED YEARS OLD AND SHOWS NO SIGNS OF DECAY.

We found the native Cuban very accommodating and hospitable. They live easily in quite a primitive way. All of them raise large families, some houses where we stayed at night having from fifteen to twenty-four children. I don't know where they put them all at night; for they always gave us room to hang up our hammocks.

I found many Americans in Camaguay Province, near the railroad, raising grapefruit and sugar cane. Sugar cane grows here from 15 to 20 years from one planting, requiring no cultivation during that time. The land is first cleared by cutting down all brush and timber and then dry burned. The cane is planted among stumps and logs by using a bar to punch a hole in the ground and sticking in a piece of cane. After fifteen or twenty years it is plowed and new cane planted.

I saw a small circular-saw mill at Moron, Cuba. They were cutting all kinds of native woods. Most of the logs came from a distance of twenty miles and were hauled in cane carts, in a most awkward manner. The capacity of this mill, I should think, was about

3,000 feet per day, and most of the lumber, after being sawed, was cut up into cart material.

I also saw a small band mill in Havana. It sawed logs that were shipped in on cars from the lower end of the island. All of the lumber cut in this mill was worked up into carts, furniture, interior finishes, etc., in a factory connected with the mill.

There are few mills on the island and very little timber. What timber there is, I was told, is in Oriente Province and Camaguay Province. The tracts that I looked at are said to be the best timbered tracts on the island.

A railroad has been surveyed near these lands and will probably be built this year. This would give this part of the island an outlet which is greatly needed. The timber could then be handled and the lands, which are the very best cane lands, could be put into cane cultivation, tobacco or fruit.

I took a great many views of the timber, but owing to the thick brush and heavy overhead foliage and shadows few of them were good.

MY HEROES

By J. R. SIMMONS.

I stood, today, beneath a mighty tree,
And gazed upon its lofty trunk and crown,
Scarred body, branches gnarled and leaves of brown;
In silence looking upward wonderingly.
Full oft have I thus pondered on the sea,
Or on the mountains, when the sun was down,
Upon their age and grandeur, or the sound
Of rushing waters and the whispering breeze,
To waken and inspire the best in me.
Comes then the thought of those strong men I've known
Who've stood and fought their battles, like this tree.
They know it not, but when each deed is done
Of theirs, I marvel e'en as silently,
And owe them each small victory I have won.



PILE OF HEMLOCK BARK.

TONS OF THE BARK PILED IN THE WOODS OF GARRETT COUNTY, MARYLAND, READY FOR SHIPMENT TO A TANNERY.

THE STORY OF HEMLOCK

By HU MAXWELL.

NOT so long ago, when some of us were grown men, and others were only boys, the well-known hemlock tree was valued only for its bark, and after this had been stripped off the logs were left to rot or to burn in the woods. Now the logs are more valuable than the bark. Also, due to the early reckless cutting of the trees for their bark alone, and to the fact that hemlock finds it difficult to reproduce itself the supply of the wood is rapidly diminishing, and it will not be many years before hemlock will practically disappear from the forest lands east of the Rockies.

At present it serves many useful purposes, quantities of it are used in paper making, it makes an excellent railroad cross-tie, it is fine for box making because of its clear whiteness, it is good for staves, many use it for siloes, and it

is claimed to be equal to white pine for building barns and fences, while it is in demand for making caskets, furniture and even musical instruments.

Hemlock was one of the earliest tanning materials in the country, and it is still used to a greater extent than any other, though the production is declining. The number of trees felled for their bark alone in past years almost surpasses belief. The fact is, hemlock has been the victim of the worst forest wastes of all the many that have occurred in this country. The mistaken notion of early times that the wood possessed little value was responsible for part of the destruction. The bark was bought by tanneries, but there was no bid for the wood; consequently, no one was disposed to protect it.

Years before lumbermen would look at the tree, bark peelers were felling the



BARK PEELERS AT WORK.

THE PEELERS HAVE STRIPPED THE LOGS IN THE BACKGROUND AND ARE READY TO ATTACK THE BIG LOG IN THE FOREGROUND. IN THE EARLY DAYS OF THE INDUSTRY THESE LOGS AND SLASH WERE LEFT IN THE WOODS TO ROT.

finest trunks by thousands. It was not unusual for extensive tracts to be stripped of hemlock timber without a single log going to sawmills, a cord to pulp mills, or even a railroad tie saved from the wreck. The peeled trunks lay criss-crossed upon hundreds of acres, after the bark was sledged down the tote roads to the railway spur to be loaded on gondolas for the tannery. Fire always followed and completed the desolation; for the immense tangle of tops and trunks furnished so much fuel to the flames that any trees which may have been left standing were killed, root and branch.

Fortunately, that destructive system is practiced no longer; for the logs are more valuable than the bark, and are removed before the fire season arrives. The value of the annual harvest of hemlock bark is between six and seven million dollars. It weighs about 700,000 tons. The production in the leading States is: Pennsylvania, 254,434 tons; Wisconsin, 123,163 tons; Michigan, 88,-

061 tons; West Virginia, 77,661 tons; New York, 76,447 tons; Massachusetts, 26,889 tons.

It should be explained that the foregoing figures represent the quantity of bark used in the States named, which is not necessarily the amount actually peeled in those States; but tanneries are usually located in the regions of chief supply, because it is more economical to build tanneries near the bark than to ship the bark to distant tanneries.

REGROWTH IS SLOW

Hemlock forests rate low in their ability to reproduce. The woodsman's axe can destroy the hemlock forest more speedily and more completely than in the case of any other important timber. It is because seedlings must have abundant shade, or they will perish. When the sunlight is let in, by the felling of the trees, the seedlings dry up and die. That is one of the reasons why young stands of this timber are not coming on where the old have been

removed; and the result is being felt. There is no second growth, and the pulpwood cutter is the first person to feel this loss, because he takes trees which are smaller than the lumberman can use.

Two and a half million cross-ties are hemlock's annual contribution to the country's railroad construction. Like pulpwood, these are usually cut from timber of medium size.

Stock coopers use ten million hemlock staves yearly in their products. Most of these are for cheap kegs or small berries, but a higher class of cooperage demands some of this wood for pails, buckets, and tubs.

Hemlock timber has a reasonable share of shortcomings. Many trunks are wind-shaken; ice cracks are numerous in old specimens; and multitudes of hard knots are characteristic of the lumber. Yet large trunks contain a fair proportion of clear wood suitable for high-class work, such as doors, window frames, and flooring. It has low rating as a figured wood, nor is it praised on account of pleasing color; yet select stock shows agreeable grain formed by the arrangement of the annual rings of growth; and the slightly pinkish tint is delicate and pleasing.

ITS SHARE OF PRODUCTION.

Though hemlock supplies about six per cent of all the lumber production of the United States, it fills other important places in the list of the country's resources. More than half a million

tons of paper pulp are made of this wood yearly. It is next to the largest in production, spruce alone rating above it. The pulp made from hemlock is fourteen per cent of the total output. The yield, however, is not increasing. As in the case of lumber, the maximum seems to have been reached, and for the

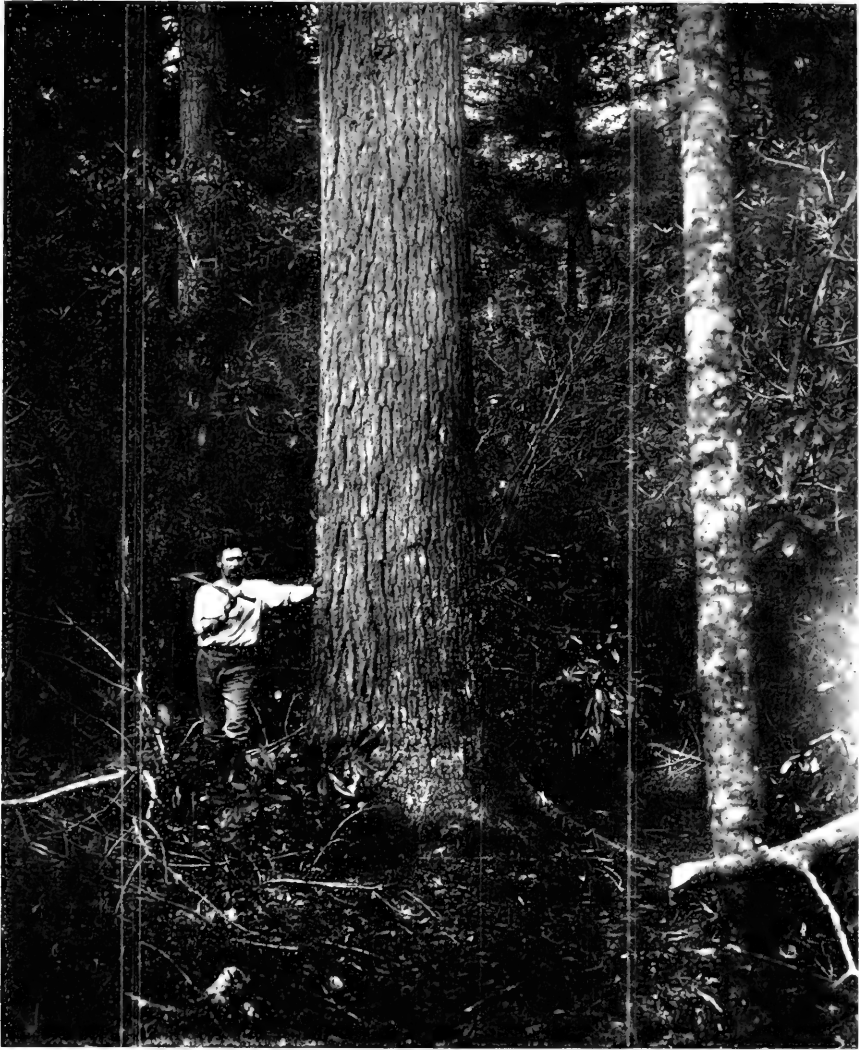


FROM CUTTING TO RAILROAD.

This hemlock bark has been brought down the mountain on sleds to the loading platform on the railroad spur, the scene being in North Carolina.

same reason—diminishing resources of raw material.

The markets opened their doors to hemlock only gradually. The wood's early uses were few and small. Builders of ships and boats seem to have been the first to give it a place. That was at a time when white pine was plentiful in the North and East. No general demand for hemlock was found until



FINE HEMLOCK AND TYPICAL FOREST SURROUNDINGS.

This splendid specimen grew in a deep ravine among the high mountains of West Virginia. The great laurel or rhododendron is seen in all its vigor ready to engage in rivalry with the hemlock seedlings to possess what little vacant ground may remain in the deep shade. A beech near by has held its own in competition with the hemlock. The largest tree is $4\frac{1}{2}$ feet in diameter. Few hemlocks attain greater size or smoother trunk.

white pine's increasing cost invited substitutes for that wood. One of the first places filled by hemlock was on the farm, where fences and barns were built of it. In most respects it was equal to white pine for those purposes. It did not work quite as easily, but not much cutting and fitting were required in building a plank fence or in framing and siding a barn or granary. Barns and other buildings are still standing,

and are in good condition, which were constructed of this wood from thirty to fifty years ago, and an extreme period of service exceeding one hundred years is on record. Such instances are valuable as matters of history, showing along what lines hemlock was first utilized in this country.

The lines then established have been maintained ever since, with many additions and enlargements.

WHERE HEMLOCK GROWS

The commercial stands of Eastern hemlock are found principally in Wisconsin, Michigan, West Virginia, Pennsylvania, New York, and New England. Timber of excellent quality but not in large amounts grows in the western parts of Virginia and North Carolina and the eastern portions of Kentucky and Tennessee. It is now more abundant in Wisconsin and Michigan than in any other States, the remaining stand there having been estimated at 25,000,000,000 feet. That is sufficient to supply the whole hemlock lumber output, at the present rate of cut, for about ten years. It is believed that not more than half of the hemlock is in Michigan and Wisconsin, and if that shall prove correct, there is supply in sight for twenty years of lumbering. This takes no account of the Western hemlock, which does not occur east of the Rocky Mountains, and which has not yet entered the markets in large amounts.

The output of hemlock has been declining for several years. The cut of lumber in 1912 was 29 per cent less than in 1899. This decline is due solely to the lessening supply of timber. Mills have been cutting out other hemlock and have not gone to new stands where more could be had. This has been occurring throughout the whole range of the tree, from Maine to Minnesota, and from Canada to the southern Appalachian States.

In 1909 a cut of hemlock was reported by 8,572 mills in the United States, and in 1912 the number of mills fell to 5,614. The decrease in the number of mills, however, was not as great as these figures imply, because in 1912 many small mills were omitted from the census returns of lumber.

The total hemlock lumber production in 1912 was 2,426,554,000 feet, which is 200,000,000 in excess of the total of the above table. This difference represents Western hemlock milled on the Pacific coast.

Statistics which have been compiled represent fairly well, but not with entire accuracy, the extent of the hemlock

lumber operations in the several States. Hemlock logs frequently cross State lines, and what is logged in one State may be sawed into lumber in another. That doubtless occurs in New Jersey, Ohio, and Indiana, which have little standing hemlock timber, yet some millions of feet of logs pass through their mills in the course of a year. Logs are even brought across the line from Canada, and boats on the Great Lakes and ships on the Atlantic Ocean may land in regions where hemlock does not grow.



SFM

HEMLOCK CONES AND SEEDS, NATURAL SIZE.

The closed cone is the summer form which retains the seed; the open cone represents it late in winter after the seeds have escaped.

The trees usually occur in thick stands, often not associated with any other commercial timber; but at other times they are mixed with hardwoods. In the former case, a logging operation may handle hemlock only, and cut the tracts clean, leaving no young trees for the future. If the timber is associated with hardwoods, it is customary to lumber all at one operation. When that is done, hemlock and birch usually reach the mills together, also with some maple and birch.

RAILS INSTEAD OF WATER.

The spectacular log drives of former years on rivers from Maine to Minnesota were made up principally of white

pine, with not much hemlock in evidence; but in recent years the river drives, though in most instances not so large as formerly, contain more hemlock. No one cared to cut much of it while white pine was plentiful, but hemlock's turn came later, and the spring floods in northern rivers carried millions of logs to the mills below.

The log drive still holds a prominent place in logging operations, but it is not what it once was. The timber is too far back from floatable streams. Railroads must be constructed to land it on the banks, and it is becoming more and more the custom to build the railroads all the way to the mills, and not end the tracks at the river bank. The operation of floating logs is not always as economical as it looks. There are jams to be broken, logs to be rolled or hauled back to the channel after lodging high on shore; and now and then disappointment in expected floods is experienced, while logs are left on the dumps during the summer to become sap-stained, or bored by beetles. Sometimes too much water comes, booms break, and logs scatter to the seven seas.

These and other drawbacks to the drive have stimulated railroad building all the way from forest to mill. Instead of coming in once a year, at flood season, and all in a bunch, the logs now arrive regularly, year in and year out. Floods do not hasten or droughts retard. Twenty-four hours after the tree is felled in the forest, the logs may be on the mill carriage fifty miles away. Sap-stain has had no time to strike, or bugs to burrow.

The popular notion that log railroads are crude, temporary, and of short length, needs revision. Some may be of that kind, but those built for business are not. They compare favorably with trunk lines in the matter of grades, bridges, and tracks. The log train is quite a respectable affair, with from ten

to forty cars, piled high with logs, and moving with a speed which does not in the least suggest lack of locomotive power. The length of some typical log roads exceeds 100 miles. Many mills receive no logs from a less distance than fifty miles. This is a radical departure



BARK PILED FOR FUTURE USE.

This is the generally accepted method of piling the hemlock bark for use when it is needed. These piles, at Ridgeway, Pa., are the property of the United States Leather Company.

from methods prevailing some years ago when hemlock was just beginning to edge its way into some of the most convenient mills.

THE USES OF THE WOOD

Perhaps the best general view of the range of hemlock's uses can be obtained by examining somewhat minutely its uses in a typical region. It is true that the utilization of wood in one locality is



AN ORDERLY HEMLOCK LUMBER YARD.

The boards are well piled, assuring that they will air season without warp, curve, split or twist. Care in manufacturing and handling has been largely responsible for the popularity of hemlock lumber. The user gets it in good shape.

not always a criterion, or even an index, of its uses everywhere; but when the region so selected is large and representative, it should serve as a reliable guide. If Ohio is chosen it makes a good showing. It is not a hemlock State, but lies near enough to the regions where this timber grows to draw freely from it, and to provide a good market. The following table outlines the market for hemlock in Ohio:

<i>Industry.</i>	<i>Feet Used Annually.</i>
Planing mill products.....	13,675,000
Boxes and crates.....	1,267,175
Machine construction.....	260,000
Caskets and coffins.....	250,000
Agricultural implements...	207,000
Furniture	202,000
Ship building.....	100,000
Car building and repairs...	65,789
Musical instruments.....	48,000
Patterns and flasks for foundries	30,000
Doors and blinds.....	30,000
Tanks and silos.....	30,000
Total.....	16,164,964

Each of the foregoing items represents many uses for hemlock. Planing mill products, for example, include ceiling, siding, flooring, and many kinds of interior and exterior finish. This class of articles consist of lumber which has passed through a planer and is ready for use without further work, except such cutting and fitting as carpenters give. It is stuff that is made for the general market, and not for some particular job, and is not made according to some contractor's specifications. The planing mill which turns out flooring, ceiling, and siding is often operated in connection with the saw-mill which cuts the rough lumber; in fact, the two mills are not infrequently under the same roof. The planing is done primarily to fit the stock for market, but the matter of lessening freight on the shipments is also duly considered. The shavings removed from such stock decreases the shipping weight several hundred pounds on a thousand feet. That item is worth saving; for the stock must be dressed before it can be used.



AN UP-TO-DATE BARN AND SILO BUILT ENTIRELY OF HEMLOCK IN 1912.

THIS MODERN BUILDING IS AT HEMLOCK HILL FARM, ONTONAGON COUNTY, MICH. THE BARN IS 36 FEET WIDE, 105 FEET LONG; THE SILO IS 12 FEET ACROSS AND 34 FEET HIGH, AIR-SPACED AND FROST PROOF.

and it is economy to dress it near the beginning of its journey to market, rather than at the other end. It is poor policy to pay freight on shavings when nothing is gained by doing so. This accounts for the great development of what is known as the planing mill products industry, which means that, before lumber is sent to market, it is manufactured one step further than the rough lumber stage.

The box maker is a large buyer of rough hemlock lumber. It is usually the low grades which go to this factory. The box maker is in a position to get most out of lumber of that class, because he cuts it into small sizes and can use everything except what is actually worthless. Some other industries are not so fortunate. If they work low-grade lumber they must often throw away good material because they cannot make use of adjacent defects.

Hemlock is excellent box material where much strength and moderate weight are wanted. It possesses extraordinary nail-holding power, which

is due to the presence of a large amount of tannin in the wood. That substance combines with the iron and favors a cement which grips the nail so firmly that it can be withdrawn only with difficulty. This property is of special value in crate material, and large amounts of hemlock are used for that purpose. In quantity it ranks near the top of the list of all woods of the United States for this use. The following States are among the most important users of hemlock for boxes and crates, and the figures give the annual demand and the average prices paid.

		<i>Ave. Cost at Factory</i>
	<i>Feet Used.</i>	<i>Per M.</i>
Illinois	34,472,000	\$13.42
Michigan	27,523,000	12.08
Massachusetts ...	27,394,000	17.31
New Hampshire..	20,035,000	15.00
Wisconsin	17,657,000	11.08
New York	10,448,000	19.50
Maine	4,704,000	14.72

These prices are for box lumber de-



"ANCIENT OF DAYS," A HEMLOCK BARN 104 YEARS OLD.

It was built on the Ernest Mathews Farm, Wolcott, N. Y., in 1810. The frame is beech, the roof boards and siding hemlock. The present roof is of hemlock shingles laid 20 years ago. The building has never been painted, and its state of preservation is apparent in the picture.

livered at the factories after all freight and handling charges have been paid.

The wood's whiteness is one of its chief recommendations to box makers, for painting, printing, and stenciling show finely on the finished box. This property is desired by shippers who place their advertisements on the shipping containers which carry their products to market.

The builders of machines find this wood well fitted for the sills, frames, foundations and other wooden parts. Beams of considerable size are in demand when heavy machines are being built and installed in flour mills, saw-mills, shingle mills, mining operations and in similar places. Hemlock is stiff, strong, and is sufficiently resistant to decay.

It is not customary to think of hemlock as having much of a place in the business of manufacturing coffins and caskets, yet statistics prove that it is regularly employed in a number of States. It has two principal places to fill. The largest quantity is worked into the outer boxes in which the cas-

kets are placed. It is a fact that more wood is needed for the rough burial box than for the casket itself. This was one of the first places, after farm uses, where hemlock began to displace white pine. In some localities hemlock is the leading wood in the manufacture of burial boxes.

It is coming into considerable use in the making of the casket itself. It is cut with veneer for cross-banding, and when employed in that capacity it is not visible in the finished article, but is concealed by the veneers of cabinet woods, like oak, walnut, and mahogany, which are glued upon it to form the outer and visible part. More frequently, perhaps, hemlock casket stock is seasoned lumber upon which the veneers are glued. It holds the glue well, and warping and shrinking give little trouble.

The use of this wood on the farm, for buildings, fences, and the like, has been mentioned; and while that is doubtless the largest place filled by it in connection with agricultural operations, it is in demand by the manufacturers of farm implements. It is so reported in

a number of States. The call for it is increasing for tanks, particularly the frames, and for silos where it is sometimes the principal material. New York's annual use of hemlock for silos is 1,190,000 feet, for which manufacturers pay an average price of \$24.39. This indicates that good stock is used, and the rapid increase in the demand for hemlock by silo makers shows that the wood is chosen for its qualities. The silo is a trying place for any building material, and hemlock has there proved its durability.

A categorical list of the uses to which hemlock is put by manufacturers would show a remarkable range. It would include commodities of high class as well as many which are ordinary. The total annual demand for this wood in the United States, for manufacturing purposes, is 708,752,769 feet. That does not include what is used as rough lumber without further manufacture, nor does it include pulp, cooperage stock, cross-ties, or mine timbers. In the State of New York alone the following uses of hemlock are listed:

Agricultural Im-	Flooring,
plements,	Furniture,
Baskets,	Gates,
Blinds,	Instruments
Boxes,	(Musical),
Cars,	Machines,
Crates,	Machinery (Elec-
Dairymen's sup-	trical),
plies,	Patterns,
Doors,	Sash,
Fencing (Pickets)	Ships,
Flasks,	Sporting goods,
	Vehicles.

About 32 per cent of all the hemlock lumber cut in the United States is further manufactured before it reaches its final use. In round numbers, two-thirds of the lumber is used in its rough form, and one-third passes through factories or shops to be converted into commodities.

THE PRICE OF THE WOOD

It is medium-priced among the softwoods with which it comes in competi-

tion. More of them are above than below it in mill-yard value. In a list of the commercial softwoods reported by the Bureau of the Census for 1911, where fourteen species are named, the rating accorded hemlock is shown in the following table:

<i>Wood.</i>	<i>Ave. Mill- yard Per M.</i>
Cypress	\$20.54
White pine.....	18.54
Sugar pine.....	17.52
Spruce	16.14
Redwood	13.99
Western pine.....	13.88
Yellow pine.....	13.87
Cedar	13.86
Hemlock	13.59
Balsam fir.....	13.42
Lodgepole pine.....	12.41
Lard	11.87
Douglas fir.....	11.05
White fir.....	10.64

These figures represent lumber in the yards at the mills and ready to ship. There is some change in values from year to year, but no more than changes in the values of wheat, cattle, coal, and other staple articles.

The mill-yard value is the average for all grades, that is, the lumber as it comes from the logs without sorting. This value is not the same in all parts of the country, but the differences are usually small. The value is made up of cost of stumpage, cost of logging, cost of conversion, and other necessary charges. Fifteen States produce hemlock in commercial quantities, and a little is sawed in other States.

When the prices paid for hemlock by manufacturers in certain States is compared with the value at the mill-yards in those States, apparent inconsistencies are seen. In several instances the material is delivered at the factories at an average cost below its mill-yard value in those States. This would seem to imply that the mills deliver hemlock at the factories for less than its value in the mill's own yard. Below is a table which gives hemlock's value at the

mills and likewise its cost delivered at factories in the same States:

<i>State.</i>	<i>Value in Millyard.</i>	<i>Cost De- livered at Factories.</i>
Kentucky	\$12.36	\$11.65
North Carolina.	11.08	12.00
New Hampshire	14.89	14.98
Maine	14.64	14.72
Maryland	14.33	24.04
New York	15.50	19.82
Vermont	14.65	14.28
Michigan	12.44	11.83
Massachusetts ..	16.51	17.34
Wisconsin	13.03	12.04

Only in New York and Maryland is the difference between value at the yard and cost at the factory as great as would be expected, and Maryland neither produces nor uses much hemlock.

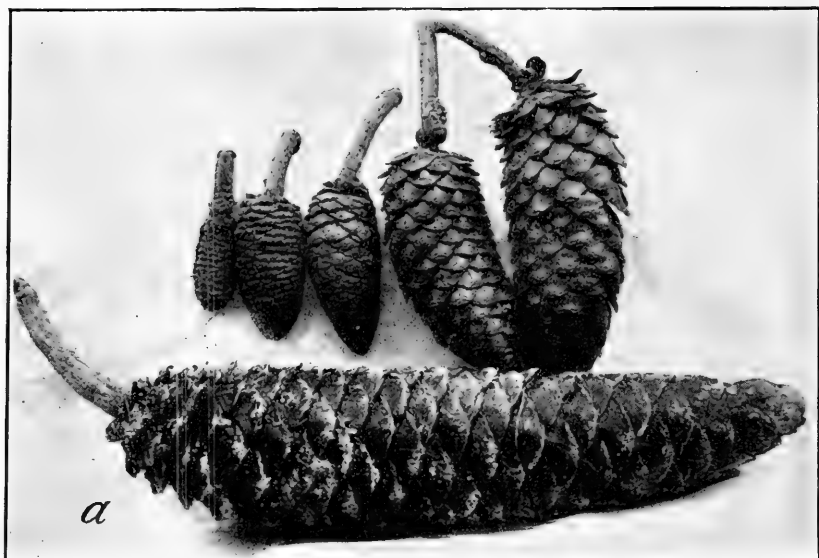
In some instances, factories buy their hemlock for less than its value in the millyard, because much that they buy was never at a sawmill. It comes to the factory as logs, and at a cost so low that the general average of all purchases of hemlock is cut down. In this way some of the apparent inconsistencies may be explained. The further fact is brought out also, by inference,

that the country's sawmill cut of hemlock does not show the whole production of this wood.

The general market buys hemlock in grades, not on mill run. An equitable comparison of prices of this wood with others should be made grade by grade, or as nearly as may be. When the wholesale prices of hemlock are considered on the basis of grades, they are found to be wholly consistent. Differences in prices in different regions are largely accounted for by differences in freight charges. The markets recognize Lake States hemlock and Eastern States hemlock. The two may go to the same markets, but usually they do not. Lake States hemlock, two-inch piece stuff, SISIE, 2"x4"—16', in 1912, was worth \$19.39 in New York State, \$16.84 in Wisconsin, and \$16.52 in Michigan. Rough timbers, 4"x4" to 8"x8"—16', were worth in New York the same year \$18.75, in Wisconsin \$17.79, and in Michigan \$16.85.

Eastern States hemlock in 1912, of the grade 8/4 merchantable, 4" to 12", 10 to 20', was worth \$18 in Pennsylvania, \$19 in New Hampshire, \$16.75 in Vermont, and \$16.75 in Maine. These examples suffice to show regional variation in prices.





CONES ATTACKED BY THE CONE BEETLE.

These sugar pine cones show effects of the cone beetle attack at different stages of the growth of the cone. The longer cone, about 14 inches in length, resisted attack, while the others were killed.

PESTS IN FOREST SEEDS

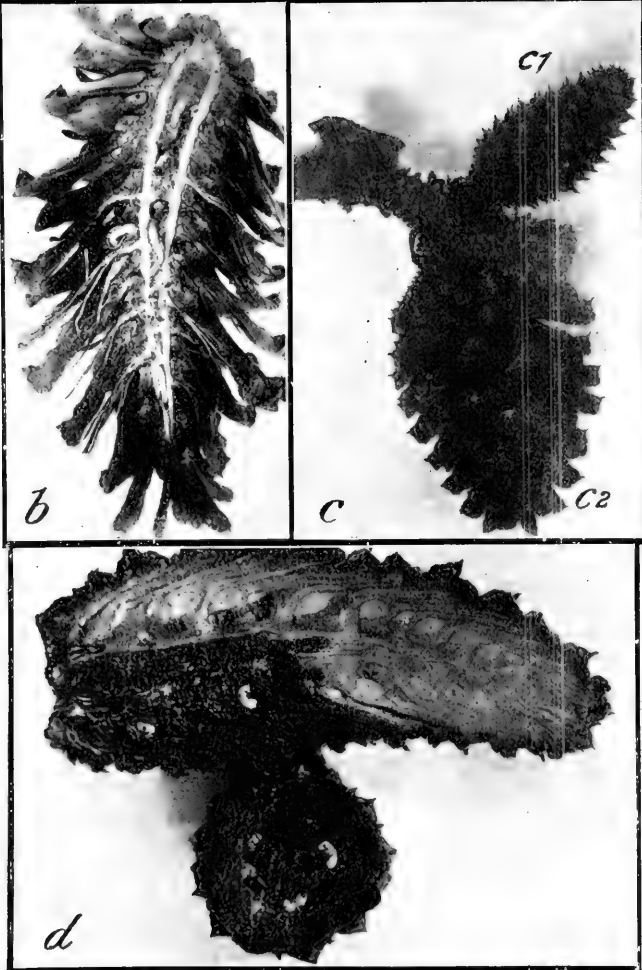
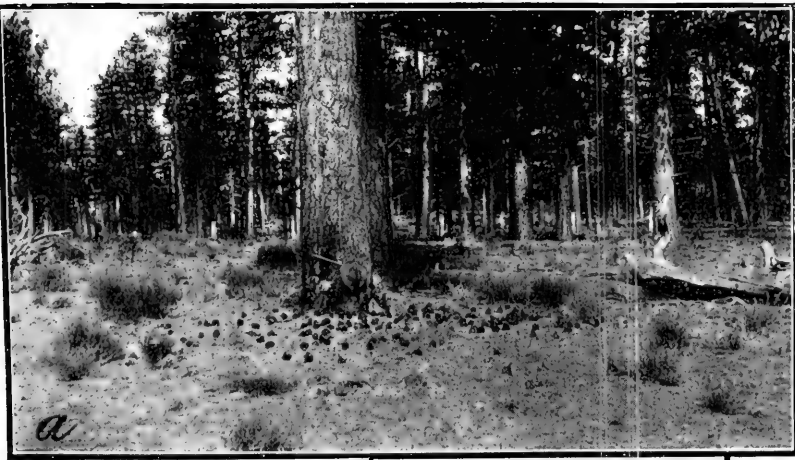
COLLECTORS of forest seeds, particularly on the Pacific Coast, are recommended by the United States Department of Agriculture to make certain that the areas in which they work are not infested by insects which damage the cones and seeds of cone-bearing trees. This damage may readily be sufficient to interfere seriously with the profits of seed-collecting. It has been found, for instance, that much of the white fir seed gathered recently for use in the Western national forests is worthless. In order to avoid, therefore, the waste of time and money involved in collecting diseased seeds, the Department advises the careful inspection of sample cones. If cones of the past season are examined during the winter and spring, they will indicate whether or not their particular area is infested, and in July and August, before the seed matures, infested cones will usually reveal immature stages of the insects.

The insects, which feed upon the seeds, may be found in almost any part

of the cone or seen but, with the exception of cone beetles, adult insects are rarely seen in the immature cone. In their immature stages, however, these insects depend for their food chiefly upon the cone scales and seeds, doing great damage before the seed ripens.

In the case of the pine, cone beetles and some of the cone worms kill the cones when small and immature and before the seeds are filled. Damage of this type is easily recognized and can be estimated after the middle of July. Cones affected in this way are called blighted. In other forms of injury, the cone is not killed but the seeds are ruined by the feeding of larvae. Damage of this kind occurs in every species of conifer and is frequently caused by caterpillars. In California and southern Oregon in 1912, from 50 to 90 per cent of the seed crop of Western yellow pine and Jeffrey pine was damaged in this way, although sometimes there was nothing on the surface of the cone to indicate that it was affected.

This is also true of wormy seed,



WORK OF A CHALCID IN SEEDS OF PACIFIC COAST CONIFERS.

- a* Cross section of sound, mature white fir cone with unaffected seed;
b, yellow pine seed, enlarged, infested by larvæ and newly transformed adults of a seed chalcid; two unopened seeds show exit holes made by these insects; *c*, cross sections of two maggoty white fir cones; *d*, male and female adults of seed chalcid, larva in opened seed of red fir and exit holes in two other seeds of same. (Original.)



HOW CONES ARE AFFECTED.

THESE LONGITUDINAL AND TRANSVERSE SECTIONS OF THE SUGAR PINE CONES, NATURAL SIZE, SHOW THE PRIMARY EGG GALLERIES, B-1 MADE BY THE CONE BEETLE.

caused by the larvae of tiny wasps, known as seed chalcidids. These feed entirely within the inner lining of the seed, which outwardly presents a normal appearance. Ordinarily the only way to detect the damage is to cut the seed open, when it will be found hollow with the small, headless maggot-like larvae lying in it. Fir suffers especially from these insects. The maggots of flies and midges also cause considerable damage to fir cones.

In looking for evidence of the presence of these various pests, beetles, worms, chalcidids and maggots, it is

frequently necessary to cut open the cone. The beetle, it is true, betrays itself by a small entrance hole at the base of the cone, with castings or small pitch tubes, during the early summer. Later the cones assume a brown, withered appearance. On the other hand, as has already been said, there is no external evidence whatsoever of the presence of the seed chalcidid. The fir-cone maggot and the cone moth can best be discovered by opening the cone, sectioning it in several different ways and then searching for the caterpillars or the active larvae.



FORESTRY AT CHAUTAUQUA

THE largest audiences that ever listened to addresses on forestry heard with pleasure and profit the speakers of the American Forestry Association at Chautauqua, N. Y., on July 9 and 10, when the Board of Directors of the Association, holding their midsummer meeting, agreed, upon request of the Chautauqua Institution, to have speakers give a number of public addresses.

These addresses embraced many phases of forest conservation, and as the audiences were composed largely of teachers from various sections of the country, and as they will carry to their class-rooms the instruction and forestry knowledge they received, the educational advantages of the meeting are evident. Dr. Henry S. Drinker, President of Lehigh University and President of the American Forestry Association, opened the first meeting with a general outline of the forestry movement and of the work of the Association; Prof. J. S. Toumey, head of the Yale Forestry School, followed with an address on the teaching of forestry in the public schools. C. R. Pettis, Superintendent of New York State Forests, spoke on State work in forestry and what may be accomplished by it; Mr.

J. S. Whipple, President of the New York State Forestry Association, told of what forestry has done and could do for New York State, and Harris A. Reynolds, Secretary of the Massachusetts Forestry Association, spoke of the progress made in his State.

In the evening there were illustrated addresses by Dr. B. E. Fernow, dean of forestry at the University of Toronto, on the battle of the forests, and by Don Carlos Ellis, of the Forest Service, on forest fires.

On the second day E. T. Allen, forester of the Western Forestry and Conservation Association, made a deep impression in his talk on the forests, lumber and the consumer; Capt. J. B. White, a native of Chautauqua County and widely known as a leading lumberman, talked in a most interesting manner about forest conservation for lumbermen, and Dr. J. T. Rothrock, a famous forester and first forestry commissioner of Pennsylvania, spoke of the relation of forests to the human product of timberlands. In the evening Dr. Rothrock gave an illustrated lecture on the close relation of soil, water and forests, and J. E. Rhodes, Secretary of the National Lumber Manufacturers' Association, told how lumber is made.

TROUT IN FOREST STREAMS

PLANS to completely restock all trout streams and lakes throughout the national forests of Colorado, Wyoming, and South Dakota, within a period of nine years, are well under way, as the result of the approval by the Federal Bureau of Fisheries of a plan of operation prepared by the Forest Service. The Bureau of Fisheries has promised to furnish the necessary fish fry for distribution to the various forests, the

shipments of fry to be directed to railroad stations nearest the waters to be stocked so that as many streams as possible may be supplied from a central point. The planting of all fry will be performed by forest officers, who will keep close check on the results of the work.

According to the estimates of the forest officers, approximately 20 million trout fry of the brook, rainbow, and black-spotted varieties will be needed

to meet the requirements of all the waters adaptable to the production of trout. Of this great number the Bureau of Fisheries is prepared to supply something over four and a half million this year and a gradually decreasing number each successive year for a total of nine, at the end of which time it is expected that the complete restocking will have been accomplished. The estimates are said to cover 273 streams and lakes in the three States.

The restocking of National Forest streams in all States where such forests are situated, including those now being acquired in the White Mountains and

the Southern Appalachians, will be given attention as rapidly as supplies of fish fry become available for planting purposes. The Forest Service is admirably organized to carry on work of this kind and does so with practically no interference with regular activities since the fish must be handled with the utmost haste and frequently during the late evening or early morning hours. The production of the existing Federal and State fish hatcheries is hardly adequate to meet all demands, however, and therefore the work has to be done in installments.

PRIVATE TREE PLANTING

ONE hundred thousand pine trees are now being planted in the Adirondacks at the expense of Richard J. Donovan, of New York City, who has in the past four years had some 265,000 others planted in the same district, and who is doing much to inspire and encourage other land owners to pay attention to similar work on their own land. "I personally investigated tree planting in the Black Forest in Germany, in Switzerland and throughout the country before planting the forest in the Adirondacks," said Mr. Donovan in describing the planting. "The restoration of the forests in the Adirondacks and in fact throughout the country is the most important economic question before the people.

"Interests in the restoration of the forests of the Adirondacks should be enhanced. It improves the scenic beauty of that charming region. It prevents floods by holding back the water by the leaf mold and little reservoirs that are created by the roots of the trees. It affords places for the melting snow and keeps back the water.

"Conditions in the Adirondacks are ideal for tree planting, especially for pine and spruce, and other conifers

The cost per acre will vary from \$2 to \$7, depending upon the age of the trees, how far apart they are to be planted, soil conditions, and the efficiency of the tree planters. Small trees can be purchased from the State conservation commission for \$1.50 to \$4 per thousand, depending upon the age of the tree.

"The danger of fire in the Adirondacks is no longer an excuse for hesitating to preserve the forests and restore the forests by tree planting, for the reason that the railroads that heretofore caused the fires are today the greatest protectors that the forests have, because oil is used as a fuel, and a patrol follows each train in the summer time from station to station, prepared not only to put out fires that may be caused from a train, but also to report other fires.

"I should like to see a tree-planting association in the Adirondack mountains that would have enrolled in it every man and woman who owns a foot of land in that delightful region. A beautiful forest can be developed in from 10 to 15 years, which may be seen by the developments where the State conservation commission planted about a dozen years ago."

\$50,000.00 Bond Issue

of the

American Forestry Association

To Members of the American Forestry Association:

It has been decided by the Board of Directors to issue bonds of the American Forestry Association to the amount of \$50,000, paying six per cent interest and redeemable within twenty years.

The money will be used to improve the magazine AMERICAN FORESTRY, put it on a more influential and better paying basis, increase the membership of the Association and extend its very important educational work.

The Association has no debts, it is sound and strong financially; the magazine, AMERICAN FORESTRY, returns a substantial profit, which is used in educational work, but the Directors realize that with money to spend for development work, the Association's value to the general public can be greatly advanced, and its membership largely increased, and at a profit to the Association.

Therefore subscriptions to the bond issue are requested from members who are interested in the development of the Association and the extension of its work. The bonds are to consist of \$45,000 (forty-five thousand dollars) in \$100 bonds and \$5,000 (five thousand dollars) in \$10 bonds. Subscriptions of only \$100 or less are desired, although larger subscriptions will of course be accepted.

Subscriptions may be made direct to the American Forestry Association, or further details will be sent upon request.

SUBSCRIPTION BLANK

AMERICAN FORESTRY ASSOCIATION,
Washington, D. C.

*I hereby subscribe for \$.....of the \$50,000 bond issue of the
American Forestry Association.*

Name

Street

City



A TYPICAL GAME REFUGE

Stock is being kept out of this area so that it may be turned into a game refuge. The view is looking across Boulder Basin from the South Fork Divide in the Shoshone National Forest. The timber is Lodgepole pine and Douglas fir.

A CHANCE FOR THE GAME

By SMITH RILEY.

THESE are 180 million acres of National Forests in the United States and Alaska, within the borders of which practically every type of forest land is to be found. Excellent forage conditions are everywhere available, and an enormous amount of domestic stock is annually developed and fattened upon the forest ranges. As meat values continue to advance, other ranges, now inaccessible, will receive domestic stock and the number carried yearly by National Forest ranges will be increased. The question is asked: What is to become of the big game that in the past was so plentiful throughout our moun-

tainous country? Must it all go as have some of the species that once occupied the great plains country? Many people have decried the current belief that the game must perish as settlement advances, and that the mountain ranges are needed to summer stock which can be wintered at a profit upon forage crops produced upon the settlers' tillable lands. It would appear from the location of game refuges in different parts of the country that there is sentiment in favor of preserving at least certain species of big game animals. This movement is looked upon by many as founded largely upon sentiment and not as a practical matter.



WHERE HUNTERS MAY HAVE GOOD SPORT.

INACCESSIBLE TIMBERLINE COUNTRY WHICH IS NOT SUITABLE FOR SHEEP, BUT WHICH WOULD SERVE AS AN EXCELLENT GAME REFUGE. IT IS THE BOONVILLE NATIONAL FOREST.



EXCELLENT FOR MOUNTAIN SHEEP.

This area is in the vicinity of the Chicago lakes at the head of Chicago Creek in the Pike National Forest and an effort is being made to have it set aside for the mountain sheep which are plentiful in this region.

The placing of domestic stock upon the range is purely a matter of dollars and cents, and the question arises as to whether we can not consider the game question upon this same basis. There is no mountainous range region in the National Forests but what from one-fifth to one-third of the area is considered unsuitable for ranging domes-

tic stock of any sort, and in many cases, were the matter carefully looked into, it would be found that these so-called unadaptable mountain ranges are well suited for the propagation of game animals. Then again, the proper stocking of mountain ranges with domestic animals does not necessarily preclude the possibility of affording pro-

tection for a reasonable amount of game that would thrive upon such browse or classes of growth which the domestic animals do not use. There are also many areas closed to domestic stock—such as the watersheds from which cities and towns derive their water supplies—where such game animals as the mountain sheep and deer of different kinds would not only thrive

eliminating entirely the sentimental reasons for such protection, is also worthy of consideration. Within the last two years the State of Wyoming has received from \$20,000 to \$25,000 from the sale of game licenses, and the cost of administering the game department has been about half that amount. The purchase of licenses at \$2.50 each for a resident hunter is, of course, a



TWO YEAR OLD ELK.

THIS IS THE FINE HEALTHY TYPE OF ANIMAL WHICH CAN BE BOUGHT FROM SEVERAL DEALERS AND WHICH TURNED LOOSE IN COUNTRY SUITED TO THEM WILL THRIVE AND MAKE EXCELLENT GAME HUNTING.

to advantage, but would offer no difficulty in the use of the area for water development. In many of the National Forests there are areas that are becoming valuable for summer resorts and recreative purposes. It is not advisable to allow ranging stock in the vicinity of such localities, and yet game developed in such regions would add greatly to their general attractiveness.

So there is ample range for game. The question as to whether it is worth while upon a dollar and cents basis,

small portion of the amount he actually spends in the hunting region. In the little town of Sundance in eastern Wyoming, it was found after a careful check of over two years, that the average expenditure of hunters in that section was \$36.00. In the Cody country of Wyoming, where many non-resident hunters outfit for the region south and east of Yellowstone Park, it was found that such parties spent from \$400 to \$600 each. These non-resident hunters number from 100 to 200 yearly, so



A NEW SHIPMENT.

THESE TWO-YEAR-OLD ELK, HARDY AND STRONG, HAVE JUST REACHED THE DENVER STOCKYARDS AFTER A LONG JOURNEY.

the value of the game to that section can well be realized. During the hunting season of 1912 it was estimated that 600 elk were brought out of the Cody country by hunters. A fair weight for these carcasses dressed would be 300 pounds, and at a rate of but 12 cents a pound, the actual meat value of these animals killed would net the sum of \$21,600. Add to this, then, the value of hides, antlers, teeth, and by-products.

One of the most attractive mountain summer resorts in the United States is Estes Park in the Colorado National Forest. Thousands of people from all over the country visit this park annually, and the number of visitors is increasing every year. There is an excellent game region in the vicinity of Estes Park, where there is every indication that elk, mountain sheep, and deer were at one time plentiful. As a straight money investment upon the part of the State and the hotel owners of this region, the protection of existing game for increase, and the introduction of species adaptable to this region, as a means of bringing in more visitors,

is all important. The development of game upon the slopes of Pike's Peak would also be a sound investment to the State of Colorado, and the towns in that vicinity, from a viewpoint of increasing attractions for visitors. The biggest business of Colorado Springs, Colorado City, Manitou, and Cascade is that created by the tourists that visit these towns each year. The existence of sheep, deer and elk, could they be seen in their wild state by campers, burro parties, or from the trains making the trip up Pike's Peak, would be an additional feature there and would attract more visitors.

The people want to see the game protected and will assist any honest and sincere move upon the part of the authorities to this end. It is true that at present there is a wholesale disregard of the game laws in the game States; however, it must be realized that the States are largely responsible for this because of the odium which has grown up around the position of game warden through the class of men appointed to that office. Many of these



YEARLING ELK.

SHIPPED FROM JACKSON'S HOLE, WYOMING, BY THE UNITED STATES BIOLOGICAL SURVEY AND THE FOREST SERVICE. THEY ARE HERE SHOWN HERDED IN THE DENVER, COLORADO STOCKYARDS.

men in the past have had no knowledge of the regions in which they were appointed and were unable to take care of themselves when traveling in the mountain countries. Other appointees drew the salary attached to their positions, winked at the violations of the law by their friends, and attempted to make arrests or secure convictions for

absolute, and, of course, this served to discourage those who honestly endeavored to enforce the laws. When the Federal Government, through the rangers of the Forest Service, began to cooperate with the States in the enforcement of the game laws on the National Forests, it was an up hill business. Forest officers who, during the



ELK COMING OUT OF THE DIP.

WHEN THESE ANIMALS ARRIVE AT THE DENVER STOCKYARDS THEY ARE AT ONCE RUN THROUGH THE DIP, WHICH IS FILLED WITH A STRONG DISINFECTANT.

game violations only against strangers or against those to whom they were unfriendly.

Of course the violation of the game law enforced by such agents was bound to be considered a trivial matter, and to be arrested by such officers of the law resulted in much bitterness. As the farcical enforcement of the game laws grew up, it became almost impossible to secure convictions before local peace officers, even where the evidence was

early years of federal administration, were in a more or less difficult position trying to enforce the Forest regulations, did not relish the disagreeable task of assisting the State in this work. There were so many glaring examples of difficulties to be overcome that they realized it would be years before the work could be brought to such a standard that the people of the communities would respect and assist in the enforcement of the law. Where this coopera-



A TYPICAL MOUNTAIN SHEEP RANGE.

Mt. Evans in the Pike National Forest from the head of Chicago Creek showing more of the area that is far too rough for domestic sheep and should therefore be designated as a mountain sheep range.

tion has been in effect, happier conditions have been brought about and the people are now showing an inclination to back the officers in prosecutions under the law.

Increased interest and cooperation on the part of stock associations, gun clubs, organizations of sportsmen, and the Order of Elks will eventually force all game States to oust the inactive spoils politician who uses his position only for political ends, and to fill the office of game commissioner with strong men, conversant with game conditions and men who will devote their entire time to game protection. There must be keen cooperation between the State Game Departments and the Federal Government; and the Federal Government, through the Biological Survey and the Forest Service, must take the initiative in studying conditions for placing game upon suitable ranges now unoccupied by game. No large amount of money will be necessary. As has already been demonstrated, the people of the communities near such ranges are keenly enthusiastic about this work and will subscribe liberally towards carrying it

out. The railroads are also interested and have shown a willingness to cooperate in hauling shipments of live game animals within the States free of charge. The great problem at present is to locate specimens for planting, and to figure out feasible methods of capturing and shipping. There is a big field for this work, and the States will fall in with it, provided the Federal Government will show what can be done in this line. For example, there is ample suitable mountain sheep range in the vicinity of Harney Peak in the Harney National Forest of South Dakota. There are several places in Colorado where specimens for such a plant could be captured and the people of South Dakota are ready to furnish funds for the work, provided the Biological Survey will take it up. There is excellent range for white-tail deer in the foothills of the Pike National Forest just west of Denver, Colorado, and such specimens as are needed for introduction there could be captured in the Black Hills National Forest of South Dakota.

THE MISSOURI OUSTER CASES

THE famous Missouri Ouster cases against twenty lumber companies under anti-trust proceedings, have been finally settled. On July 2nd, the Supreme Court of Missouri denied the application for a modification of judgment under the decision of December 24, 1913, reduced the fine imposed on four of the companies and withheld the ouster issued against all of the companies, if they pay the fines imposed, so long as they obey ten conditions outlined in the decision, and withdraw from direct or indirect membership in the Yellow Pine Manufacturers' Association, and all associations of like character.

The influence of this decision is far-reaching, not only in its effect on the existence and function of lumber trade organizations, but on the rights and privileges of individual companies to cooperate to the mutual benefit of both the producer and consumer. The lumber industry, which is now suffering from economic vicissitudes, is likely to be further handicapped by this court decision so lumbermen say.

Some of the companies concerned are understood to be in honor bound not to carry the case to the United States Supreme Court, and by their agreement to accept the present decision there is implied an acknowledgment of guilt, which is not in anywise borne out by the actual facts. Lumbermen say the court was not sufficiently cognizant of the conditions in the lumber business, to consider fully and fairly the economic situation which prevailed in 1907, at the time the lumber output of the State fell off abruptly, owing to the panic which reached a climax in October of that year. The lumbermen acting individually would, no doubt, have saved money if they had shut down their mills completely at the time when the demand for lumber fell off so abruptly; but since instead of that they preferred to take the broader

view of producing enough to keep their mills operating and their employees out of the bread line, they consider it an injustice that they are now fined and prevented from organizing for helpful cooperation, through some legal interpretation which they declare ignores common sense fundamentals.

The lumber trade papers are bitter in their denunciation of the decision.

The *Lumber World Review* of July 10th, says regarding it:

"It is true that the Supreme Court of the State of Missouri has done what we believe to be an unjust and monstrous thing in this alleged land of liberty by fining the lumbermen of that State nearly four hundred thousand dollars and ruling that they will be ousted from the State unless they cancel their membership in the Yellow Pine Manufacturers' Association."

The same hard-hitting trade paper says apropos of the alleged lumber trust agitation in general that:

"There NEVER WAS and NEVER WILL BE and NEVER CAN BE a lumber trust any more than there could be a bread trust or a potato trust or a rain-water trust."

"The Bureau of Corporations and Congress and all the other sections, divisions and bureaus of the United States government might just as well try to dissolve the Baptist, Presbyterian, Catholic or Methodist churches, the National Historical Society, the Society of Physical Research and all the fraternal bodies, as to prorogue, dismantle, annul and kill the business organizations of the country. They might try their hands at knocking out the Chamber of Commerce of the United States and each business institution in turn, but if they did the whole fabric of government would fall asunder."

The *American Lumberman* of July 11th connects the decision with the attitude of politicians towards business interests, by saying:

"This decision * * * goes with pending legislation, with other court decisions and with a manifested attitude displayed in Congress, and exploited by politicians who wish to profit by the arousing of prejudices of a certain class of the voters against all who are apparently successful in business life."

The same paper goes farther and touches on a social aspect of the matter in pointing out that:

"The manufacturer, the merchant and the banker have been the trinity that has led the progress of the world; but now the educator, the legislator, the lawyer, are reasserting themselves and are seeking to relegate to their once despised position the forces back of real progress."

This paper also discusses the fundamental idea in lumber organization, namely, that of cooperation:

"The country thought that it had discovered something worth while in the idea of cooperation as a substitute for competition. Competition was the mother of trusts, the chief means by which the rich were made richer and the poor poorer. It separated classes and was essentially undemocratic in a great democracy like ours. On the other hand, cooperation backed by sound intelligence and good will promised, in spite of possible abuses, to solve many of our modern difficulties. Now it seems, because cooperation may be abused, that we are going back to the unlimited evils of unlimited competition."

"And all this means that the modern business man and modern business are to be pushed back fifty or a hundred years. He is to be told by the dreamer, the idealistic do-nothing, the demagogic politician, that he—the creator of modern civilization—must step into the background and let them to the front. This situation is not one that affects lumbermen only, but business men of all sorts."

As to what should be done, it says:

"Lumbermen, representing one of the greatest industries of this country, one of the greatest sources of its wealth, must stand for their rights as citizens, and not only must so stand with each other but with business men of all classes. Honest business should assume the proud position that of right it should occupy, and no longer cower and apologize."

The *Lumber Trade Journal* of New Orleans, commenting upon the effect of

the decision on the Yellow Pine Manufacturers' Association, says:

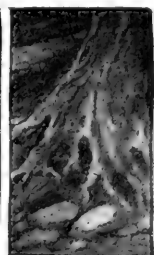
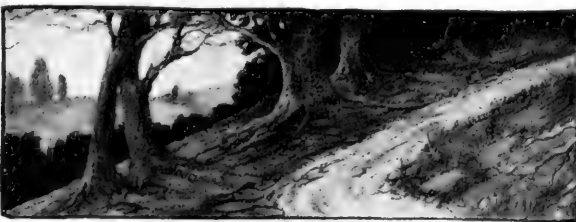
"Although the association was not a party to the suit, the judgment of the court scores it without justice or mercy. * * * The association never made prices. It is strange that the supreme court justices could not understand the evidence that was brought to their attention on this point. There was no evidence that the association did make prices, yet the court jumped to the conclusion that a price list means price making. The books of the defendant companies offered in evidence showed there were as many different prices as there were companies."

"It is useless to criticize the opinion of the court, as it will serve no purpose. The most charitable way to put it is to say that the court erred. Every lumberman knows that it did not get the perspective of the case."

Of the effect of the decision on the Yellow Pine Manufacturers' Association, the *Southern Lumberman*, of Nashville, says:

"It would seem that the court could keep the acts and practices of the lumbermen under even better surveillance if they are operating through the Yellow Pine Manufacturers' Association than if a new organization under a different name should be formed. The court has certainly had opportunity to become thoroughly familiar with all the inside workings of the present yellow pine organization."

"It must be that the court has not as fully considered this particular part of its final decree as it should have done and that upon proper showing it will vacate the prohibition as to membership in the association. The court must recognize that there is a legitimate field for organization in the yellow pine industry. It must recognize also by this time that there were many members of the association who were all the time in little sympathy with efforts at price-fixing and curtailment, and that there are many yellow pine lumbermen who have for years refused to have anything to do with the association on account of its activities along these lines; and, finally, that with all effort along these lines abandoned and discontinued the association is in position to render more useful service than ever before."



USING BLIGHTED CHESTNUT

HOW chestnut timber that has been killed by the bark disease can be utilized to bring the most profit is told by the Department of Agriculture in a bulletin just issued for the benefit of farmers and other timberland owners in the States where the blight has appeared. Most of the chestnut timber north of the Potomac River has been attacked and much of it killed by the disease, which is now spreading to Virginia and West Virginia.

Sound wood from dead chestnut trees is fully as strong as wood from healthy trees, and is suitable for poles, lumber, ties, slack cooperage, mine timbers, tannin extract wood, shingles, fence posts and rails, piles, veneer, and fuel. It can not be used profitably for tight cooperage, for wood distillation, or for excelsior.

Disease-killed chestnut does not begin to deteriorate until two years after death, and in most cases it has been found that trees up to 10 inches in diameter can be sawed into merchantable products after they have been dead four years, trees from 10 to 18 inches in diameter after they have been dead five

years, while trees above 18 inches in diameter are merchantable six years after death. It is best, however, to cut and utilize infected trees as soon as possible after they are attacked. Diseased timber is still live timber, and can be sold as such, while dead timber, even though sound, always presents difficulties in felling, manufacturing, and marketing.

In deciding what product to manufacture from his stand the farmer, or other timberland owner, should first consider his own needs for fuel, fence posts and rails, split shingles, construction material for barns and sheds, or even interior finish for a new house. If a woodlot owner has more dead timber than he can use himself or dispose of to his neighbors, he should consider making one or more of the following products to be sold to dealers, railroads, or manufacturing plants: Poles, sawlogs, hewn ties, slack cooperage bolts, tannin extract cordwood, mine timbers, and cordwood for brickyards, lime kilns, brass factories, iron foundries, etc. Any of these products can be made with the tools kept on every farm.

Planting Three Million.

Nearly three million young trees are being set out this spring on the national forests of northern Idaho and Montana. On the St. Joe National Forest in Idaho three thousand acres will be planted.

Students at the Forest Nursery.

Students of the Oregon Agricultural College are working at the forest nursery on the Siuslaw forest. The arrangement is said to be mutually satisfactory, since the students gain experience in forest nursery practice and their assistance lowers the cost of nursery work.

THE CANADIAN DEPARTMENT

By ELWOOD WILSON

Mr. R. H. Campbell, Director of the Dominion Forest Service, has gone abroad for a trip and will visit the different European countries, making a study of administrative questions and forestry methods.

Mr. G. C. Piche, head of the Quebec Forest School, is on his annual field trip with the students. The place chosen this year is Mr. Piche's own estate of about 1,500 acres at Burrill's siding, about thirty miles north of Three Rivers.

The reorganization of the Fire Protection work of the Canadian Pacific Railway by which this work will be handled by the Forestry Department, is a most important change and will increase the efficiency of the work.

The coming convention of the Canadian Forestry Association to be held in Halifax, N. S., from the 1st to the 14th of September, will be a very important one. It is the first one ever held in Nova Scotia, and the attendance promises to be large. Halifax is a beautiful city and contains much of historic interest.

Mr. J. E. Rothery, of the firm of Vitale & Rothery, of New York, has just been elected to active membership in the Canadian Society of Forest Engineers. This election is the first of a non-resident of Canada, the restriction of the membership to Canadian residents having been removed at the last meeting following the lead of the Society of American Foresters. It is desirable that the relations between these two professional societies should be as close as possible.

The long drought and cold weather which continued into June this spring made the fire-protection situation one of

great difficulty. In the territory covered by the St. Maurice Forest Protective Association there were more fires than during the previous season, but all but two were extinguished by the rangers. Settler's fires, which have usually been nearly half of the total number, were reduced by over fifty per cent, owing to the action taken by the Government in conjunction with the Protective Association last season, namely, warning the settlers at the beginning of the season and then arresting promptly and fining all offenders against the regulations. This spring the settlers and their parish priests are joining the Association in a petition to the Government to make a law forbidding the setting of fires for clearing land at any season without a written permit from the fire-ranger of the district. Most of the fires this spring were set by river drivers employed by the companies forming the Association, and stringent measures are to be taken to prevent this next season. The Quebec & St. Maurice Industrial Company have not allowed their drivers to smoke this spring, and this has proved a great preventive. One of the two fires mentioned above was set by the section men of one of the railway contractors burning ties and spread over twenty-five square miles. The section men were warned not to set fires, but their foreman was ordered by their engineer to go ahead, and this was done although the weather was extremely dry. Such gross carelessness on the part of men who are well educated enough to know better is inexcusable and shows the need for education about fires for the general public.

The Lower Ottawa Forest Protective Association was formed too late this spring to allow for getting their field work in proper shape, but in spite of this they did excellent work and demonstrated the value of cooperative effort.

The owners of summer homes and camps to the north of Montreal in the Laurentian Mountains had a meeting and took steps to form an Association to protect their holdings. The leader of this movement is Mr. R. A. Outhet, landscape architect of Montreal, and the members are prominent Montrealers. One of the most enthusiastic members is Mr. Guy Tombs, general passenger agent of the Canadian Northern Railway, which has also improved its system of fire protection along its lines this season.

Snow fell to the depth of five inches about one hundred miles north of Montreal on the *nineteenth of June*.

The Laurentide Co., Ltd., has entered upon a tree-planting program which allows for planting of 500,000 trees per year. A beginning on a commercial scale was made this spring by planting 110,000 Norway spruce, which, up to present writing, have done remarkably well. In 1908 this company began planting, about 20 acres being planted to white Scotch and jack pine. These trees are now from four to eight feet high. In 1912, 10,000 Scotch pine were planted, and in 1913 about 12,000 Norway and white spruce; 10,000 Norway pine and 50,000 Norway spruce will be planted in September. There are now in the company's nursery something over 500,000 seedlings which will be ready for next fall, and the capacity will be kept at about 600,000 per annum. This company has also added to its telephone lines for fire protection and

other uses something over fourteen miles of line this season.

The St. Maurice Forest Protective Association, with the cooperation and financial assistance of the Department of Lands and Forests and the Department of Public Instruction of the Province of Quebec, is issuing in French and English a folder, printed in red and black with cuts, for distribution among school children. These folders are, with few changes in the text, the same as those already used in Pennsylvania and Massachusetts.

The Premier of the Province of Quebec, Sir Lomer Gouin, with Mr. G. C. Piche, Chief of the Forest Service, have just returned from a trip to the Abitibi region, which is being opened for settlement. The report of their trip from the standpoint of the forest resources of this district is awaited with interest.

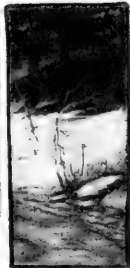
Mr. Roy L. Campbell has succeeded Mr. R. G. McIntyre as editor of the Pulp and Paper Magazine of Canada. Mr. Campbell is a forestry graduate from the University of Toronto.

The Forest Products Laboratory, in connection with McGill University, will begin active work in the fall. A complete experimental outfit for the grinding of pulp, making of sulphite pulp and of paper is being installed. The work will be in charge of Mr. Bates, who has had much experience along these lines.

A BEQUEST OF \$5,000.00

THE will of the late Miss Elizabeth Shippen, of Philadelphia, bequeaths to the American Forestry Association the sum of \$5,000. This money is given to aid in carrying on the general work of the Association in spreading the doctrine of sane and practical forest con-

servation throughout the country, and the bequest was made by Miss Shippen, for many years a member of the Association, in recognition of the excellent work it is doing, and the great need of expanding the influence and extending the activities of the association.



EDITORIAL

AN excellent plan for inspiring forest planting by cities and towns of a State is outlined in the provisions of the Town Forest Contest instituted by the Massachusetts State Forestry Association, which offers as a prize, to plant to white pine fifty acres of forest land belonging to the winning city or town. The fifty acres thus planted will contain 1,200 three-year-old white pine transplants to the acre.

The city or town entering the contest must have acquired at least 100 acres of land and set it aside officially as a

"Town Forest," and fifty acres of this land must be planted to three-year-old white pine. This planting must be done not later than June 1, 1915, and at least ten cities or towns must enter the contest.

Interest in forestry has been growing so steadily throughout Massachusetts, where, by the way, the American Forestry Association has its largest State membership, that it should not be difficult to get ten or more entrants for this contest, and such a substantial prize as 60,000 young white pine trees planted is worth striving for.

MANY thousands of teachers from every State in the Union will turn to their class-rooms this fall with well-defined ideas of the value of trees and of the forests, the need of protecting the forests from fire, the part the lumberman has played in the progress and development of the country, and the need of teaching forestry to their pupils. These ideas were implanted in their minds by the officers and members of the American Forestry Association, who spoke to them at Chautauqua, New York, on July 9 and 10. There, at large public meetings, addresses, several of them illustrated, were given by some of the most able foresters in the country, men who told of the birth, the battle for life and the growth of the forests; of their dread enemy, fire; of what part they take in the mental and physical development of a nation; of the attitude of the

lumbermen towards forest conservation; of how lumber is made; of what the forests do in the preservation of water supply and water power; and of how forestry should be taught in the schools.

There has never been in all the history of the forestry movement an occasion when so many people, representing so many sections of the country and bearing the close relation they do in the development of public thought and activity, received so much information and instruction in conservation of any kind, as did the evening audiences in the great amphitheatre at Chautauqua during these two days. It was an accomplishment in forestry education which will bear fruit within the next year in thousands of places, and in the minds of tens of thousands of students.

IT IS gratifying to inform the members of the American Forestry Association that the late Miss Elizabeth Shippen, of Philadelphia, has bequeathed to the Association the sum of \$5,000. This was one of many bequests made by Miss Shippen to organizations which in one way or the other are working for the public good. Miss Shippen was for many years

deeply interested in forestry and in the need of educating the people of this country to a realization of all that trees and the forests mean to them and to the country, and she was in hearty sympathy with the work of this association. Her money will be used to aid in spreading the doctrine of forest conservation and inspiring a love of trees and forests as she wished.

THERE is hardly a progressive city in the entire United States which has not in the last few years awakened to the need of having a skilled forester, or else a park superintendent with sufficient knowledge, to take charge of the planting and the care of its shade trees. In many cities this work is by no means easy; note, for instance, the conditions in New York City as outlined in an article in this number, and one of the chief difficulties to be overcome is the ignorance of the average citizen regarding trees. These citizens must not only be taught to give some measure of care to the shade trees in front of their residences and in their yards, but they must be educated to a realization that much of the beauty of a city depends upon the trees in its streets and that liberal appropriations are necessary if the city is to have trees which spur the pride of the citizens.

That Columbia, South Carolina, has difficulties to contend with in this respect is apparent from reports of an address made to the city council by Richard D. Sullivan, a citizen, who voiced an eloquent protest against the damage done to trees by the telegraph and telephone companies of the city. Said Mr. Sullivan;

"It is more than passing strange in the ordinary justice of things in this day and generation when a citizen finds it necessary to stand before an assembled body of men and plead for the lives of common shade trees. But, gentlemen, such is the case, and here I am.

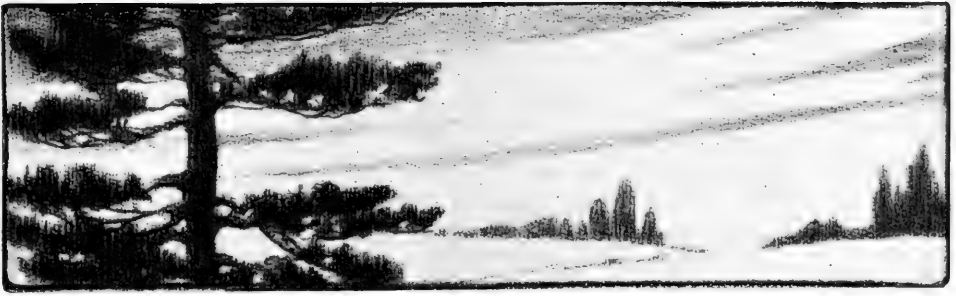
"There never was and never can be presented a bona fide argument against

the growth of trees and their proper care. True, the commercial interests of a great social body like this city may necessitate a few treeless thoroughfares; we can and do understand such a condition. But the time will never come when there will be justification for cutting the vitals of city shade trees that have required years to develop, simply because men who do not understand and care nothing for the beauties of horticulture have authority from the city to cut and destroy them at will.

"The best brains of America, of Europe and of the Orient," said Mr. Sullivan, "have proven that trees can be made to perform service for mankind in shade, in decoration, in fuel and in building material without injury to the basic growth. In the Netherlands, where trees are grown for fuel, these treasures are jealously protected. The beauty of the public highways and woodlands of England, France, Germany and other countries is enhanced by the scrupulous attention given the forests and shrubbery. The broad avenues and boulevards of many of our own cities have been praised by foreign and domestic visitors alike.

"I wish to contravene the rights of no man. My only hope in thus coming before your honorable body, is for the general betterment of our city to the end that it may be a more beautiful spot for strangers and our friends to visit—in short, the best and most desired place in the world to live."

Mr. Sullivan's eloquence won, and the council took vigorous action to insure proper care of the trees in the future.



FOREST NOTES

The National Conservation Congress has decided to hold its sixth annual session at New Orleans, La., on November 10, 11, 12 and 13, and during this same period a meeting of the Board of Directors of the American Forestry Association will also be held at New Orleans.

Members of the Canadian Forestry Association will hold their sixteenth annual convention at Halifax, Nova Scotia, September 1 to 4. It will be the first forestry conservation convention ever held there, and the forest owners in that section of Canada are expected to attend in large numbers. An excellent program has been prepared. The American Forestry Association will be represented by a number of its members.

Massachusetts has secured a law beneficial to forestry in the act which was approved on June 29 and which provides for the appointment of a State forest commission of three men, including the State forester, and gives them power to spend \$10,000 the first year, and \$20,000 each succeeding year, in the purchase and reforestation of land throughout the State at a price not to exceed five dollars an acre. Land thus acquired shall be exempt from taxation, but the Commonwealth shall reimburse cities and towns in which these lands are situated for the taxes lost by reason of their acquisition by the State.

All hope that Louis S. Margolin, the forest examiner of the Forest Service, who disappeared in the Sierra National Forest in June, is alive, has been abandoned. It is now believed that he lost his life during a heavy thunderstorm which prevailed a short time after he left his headquarters, probably by drowning while attempting to cross a swollen stream. A search for his body has so far been unsuccessful. Examiner Margolin was one of the best known men in the Forest Service with a record of many years of first-class work.

The annual forestry conference in the White Mountains, at Gorham, N. H., on July 21, 22 and 23, brought together members of the Society for the Protection of New Hampshire Forests, the Association of Northeastern Foresters, members of various fire protective and timberland associations, and members of the American Forestry Association and of the National Conservation Congress. There were several conferences and meetings during the three-day gathering at which some highly instructive addresses were heard, and considerable impetus was given to the demand that the National Government acquire more land for national forests in New England. A feature of the occasion was a visit to the paper mills of the Berlin Mills Company at Berlin, N. H., and a trip into the forest on the Presidential range.

Two accredited delegates from the North Carolina Forestry Association attended the mid-summer meeting of the American Forestry Association at Chautauqua, N. Y. Both delegates are very prominent members of the Women's Clubs in the State, Mrs. T. W. Lingle, of Davidson, being Chairman of the Social Service Department of the State Federation, and Miss Elizabeth Schwarberg, of Southern Pines, is late Chairman of the Department of Library Extension and President of the Southern Pines Civic Club. The latter writes that they greatly enjoyed what they heard at the Forestry meetings. She says: "The importance of *doing* things in the interest of forestry was more and more impressed upon us. If North Carolina is to hold her own, she must maintain her forests; and, if people only knew more about the cause, more would be done to further it. After all, it is what we *do* that counts, and I am going to talk forestry and *do* what I can in our town to plant trees and prevent forest fires. The leaders in this line of work are a capable set of men and the cause is bound to succeed."

The Department of Commerce has announced the completion of plans by the secretaries of commerce and agriculture whereby these two departments will combine in a constructive study of the supply and exploitation of timber of the United States, which they declare has now become one of the big conservation and industrial problems. In the opinion of the secretaries one of the conditions which make this study of immediate importance to the public at large is the fact that the United States is now reducing its stock of stumpage, estimated at 3,000,000,000,000 feet, at the rate of more than 60,000,000,000 feet annually.

The *Biltmorean*, an attractive quarterly magazine devoted to news about graduates of the Biltmore Forest School, appeared during June and will doubtless serve as a tie to bind the friendships formed in school days and to keep the graduates informed of the

movements and the activities of their friends. Harrison H. Morse is the editor, Harry P. Howes the manager, and Dr. H. D. House the general representative. The magazine is published at Albany.

The Forest Service has issued to automobilists of Arizona and New Mexico a letter calling their attention to the fact that last year Arizona's share of the National forest revenues was \$140,749.94 and New Mexico's share was \$53,109.84, the fund being used for the maintenance of roads and schools. These receipts come from the sale of mature timber and the grazing of stock. Obviously as the automobilists benefit by the improvement in the roads, and as forest fires annually destroy stock range and both young and mature timber, it is of direct interest to the automobilists to see that the forests are protected against fires. As sixty per cent of these fires are attributed to carelessness, the automobilists can do much to guard against them.

The well-known firm of Conrad Appel, which deals at Darmstadt, Germany, in wholesale forest and agricultural seeds, celebrated the 125th anniversary of its establishment in June. Since the day the firm started it has always been in the hands of the same family, Mr. Ludwig Heyn, the present sole proprietor, being the great-grandson of Mr. Johann Conrad Appel, the founder of the house. The business was started in 1789 and has enjoyed a long and prosperous career, being at the present time known all over the world. The firm claims to have the largest coning establishments in the world.

The summer practice terms have begun at the Georgia forest school. One man is putting in his practice term at his father's sawmill. One is working at a sawmill in Cob County. Four are preparing a topographic map, estimate of stand, and working plan report for a tract in Habersham County. These men are camping in a cabin in the woods, and they report that they are

having the time of their lives in spite of a good deal of rough work. They are able to help out their supply department by fresh fish from the Cattahoochee.

That at least one-twentieth of all the stock bred on the open range of the West dies before it reaches market age and that much of this loss can be stopped is shown by results reported from the national forests. This waste is said to add millions of dollars to the people's meat bill and gives one more cause of the high cost of living. Winter storms and summer droughts strew the ranges with the bones of cattle and sheep; predatory animals take a heavy toll; poisonous plants sometimes kill half the animals in a herd almost over night. Cattle contract anthrax, black-leg and other diseases, get stuck in bog holes, slip off icy hillsides; and sheep pile up and die of suffocation. Insects which madden and kill swell the total losses as do a multitude of other minor causes of death and injury.

The most notable progress yet recorded in the chemical treatment of timber to prevent decay was made in 1913, according to a report recently issued by the American Wood Preservers' Association in cooperation with the Forest Service of the Department of Agriculture. The report states that 93 wood-preserving plants in 1913 consumed over 108 million gallons of creosote oil, 26 million pounds of dry zinc chloride, and nearly 4 million gallons of other liquid preservatives. With these the plants treated over 153 million cubic feet of timber, or about 23 per cent more than in 1912. The output from additional plants unrecorded would increase the totals given. Impregnation of wood with oils and chemicals to increase its resistance to decay and insect attack, the report goes on to say, is an industry which has become important in the United States only in recent years. In Great Britain and most of the European countries practically every wooden cross-tie and telephone or telegraph pole receives preservative treatment. In the United States less than 30 per cent of the 135

million cross-ties annually consumed are treated, and the proper treatment of an annual consumption of 4 million poles may be said to have scarcely commenced.

Lands just approved by the National Forest Reservation Commission for purchase by the Government include 6,083 acres in West Virginia, of which one tract comprising 6,000 acres is situated in Tucker and Randolph counties in the Monongahela purchase area. The remaining 83 acres are on the Potomac watershed in Hardy County in the Potomac purchase area. These lands are to be acquired in accordance with the general policy under which national forests of good size are being built up in the Eastern mountains, both north and south through successive purchases. Tracts are bought within certain designated areas, of which West Virginia has three. The lands just approved by the commission bring the acreage of the Monongahela purchase area up to 42,887 acres and the acreage of that part of the Potomac area lying in West Virginia to 36,405 acres, while the total acreage in the State approved for purchase amounts to 105,480 acres.

The State legislature of 1913 designated the North Dakota State School of Forestry as a State nursery and provided that the president of the school should be the State Forester, and he should have general supervision of the raising and distributing of seeds and forest tree seedlings, promote practical forestry; compile and disseminate information relative thereto, and publish the results of such work by issuing and distributing bulletins, lecturing before farmers, institutes, associations, and other ways as would most practically reach the public.

A cooperative fire agreement which has been entered into between the United States Department of Agriculture and the State of Michigan provides for an expenditure by the Government of not to exceed \$5,000 a year, under provisions of the Weeks law, toward meeting the expenses of forest fire protection in Michigan.



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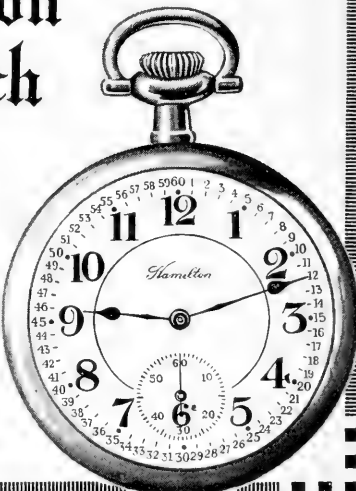
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Vol. 20

SEPTEMBER, 1914

No. 9

EUROPEAN WAR AND THE LUMBER
INDUSTRY

THE WORLD'S GREATEST WOODLOT

THE GLACIERS OF MT. RAINIER

LOGGING A RIVER BOTTOM

NATIONAL FORESTS FOR RECREATION

THE BAVARIAN FORESTER

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CONTENTS

1914

THE WAR AND THE LUMBER INDUSTRY—By Bristow Adams.....	617
With seven illustrations.	
THE BAVARIAN FORESTER—By G. H. Collingwood.....	626
With six illustrations.	
THE WORLD'S GREATEST WOODLOT—By Geo. S. Long.....	632
With six illustrations.	
NATIONAL FORESTS AS RECREATION GROUNDS—By Prof. W. J. Morrill.....	641
With six illustrations.	
THE GLACIERS OF MT. RAINIER—By F. E. Matthes.....	646
With eighteen illustrations.	
FIRE DANGER SERIOUS.....	667
LOGGING A RIVER BOTTOM—By Edward F. Bigelow.....	669
With five illustrations.	
HANDLING LUMBER BY CABLEWAY.....	673
With one illustration.	
A ROADSIDE TREE LAW—By Chapin Jones.....	674
THE WORLD'S LARGEST TREE TRUNK.....	678
With one illustration.	
FIRE PROTECTION IN CALIFORNIA—By Knowlton Mills.....	679
With four illustrations.	
WHAT IS IT?.....	683
With one illustration.	
THE CANADIAN DEPARTMENT—By Elwood Wilson.....	684
EDITORIAL.....	686
AN HONEST FOREMAN—Poem.....	688
FOREST NOTES.....	689
CURRENT LITERATURE.....	693

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American Forestry

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SEPTEMBER, 1914

No. 9

THE WAR AND THE LUMBER INDUSTRY

By BRISTOW ADAMS.

DURING the Balkan war, which is now looked upon as a minor affair in the light of the present European conflict, it was reported from Germany that the price of certain kinds of lumber had risen as the result of the demands for material for ammunition cases. With many times the demand at present, it is a fair conjecture that some lumber prices, in common with prices for other commodities, will rise, not only in warring countries but everywhere. At the same time, the activities of peace, now at a standstill over a large portion of Europe, have ceased their demands, and in addition, war imposes difficulties on commerce, which will hamper or even actually prevent the passage of goods from those who produce to those who want.

These, then, are the main fields of conjecture as to the war's effect on lumber: What depression is going to follow in the train of war, and where? Also, to look on the hopeful side, what are the possible increased demands due to war, and where may they be expected to arise?

THE DEPRESSING EFFECTS.

There may be, in countries at war, an increased demand, as with the Balkan ammunition boxes. But it is scarcely likely that the lumbermen of the United States can profit through these demands, because all such lumber would be contraband. Ship timbers have always been regarded as contraband by

Great Britain, and Germany is not going to be far behind in taking a similar view. In the contraband lists already made public it has been shown that all lumber which might even remotely be utilized in war or in distantly related projects is seizable. For example, railroad ties which might be used in repairing torn-up tracks, or in extending trackage for troop trains, would be seizable even in neutral ships. Any such material will be presumptively contraband if consigned to a port where military or naval equipment might be used. Even neutral goods in neutral bottoms may not enter blockaded ports, so, on the whole, little can be looked for except losses when it comes to questions of exports to nations at war.

LOSSES THROUGH COMMERCE.

There is no conjecture about this part of the situation. Already the shipment of lumber from the southern ports is entirely paralyzed. Great losses have already been sustained through the seizure of vessels which were on the high seas when war was declared, or through cargoes diverted to points at which the timber cannot readily be sold, because lumber intended for export to one country is very seldom in such shape as to be readily salable in another. Thus hewed timbers generally demanded by Great Britain find little market in a country which habitually takes sawed lumber.

This diversion of freight is going to

cause all sorts of trouble, and will be one of the big problems of the lumber exporter as long as the war lasts. Nor will there be any money returns from the diverted cargoes, and no settlement of claims until peace is again established. It will be understood, of course, that the present situation is temporary, but no one can tell how long it will last. Certainly it will continue as long as the nations are set against one another.

at the time this is written, it is indirectly in the toils.

In actual figures, the countries directly or indirectly involved in war take, in round numbers, 700,000,000 board feet of our timber, of which about 650,000,000 is southern yellow pine. Already, most of the firms cutting yellow pine for export have either closed down or have greatly curtailed their product. With Japan carrying belligerency into Asia and the Pacific,



EXPORTING SPANISH CEDAR LOGS FROM COSTA RICA.

THESE LOGS ARE FLOATED TO THE LUMBER FREIGHTERS BY OXEN, AND BY MOTOR BOAT. ▽ CABINET WOODS, EXCEPT THOSE FROM CENTRAL AND SOUTH AMERICA, HAVE COME MAINLY THROUGH GREAT BRITAIN, WHICH SHIPPED TO US LAST YEAR MORE THAN ONE-AND-A-HALF MILLION DOLLARS WORTH.

The southern timber regions of our country most keenly feel the effects of war, even though only about 10 per cent of the annual cut of yellow pine lumber is exported. One who has seen the square-rigged ships in Pensacola harbor, hailing from European ports, and going out laden, deck and hold, with southern pine, can readily imagine what a difference war is making in that busy port, and in others along our southeast coast. True, many of these vessels were Italian, manned by swart Mediterranean sailors, their papers made out in Leghorn, Genoa, or Venice. Yet, while Italy is not directly involved

the 50,000,000 board feet exported from the northwest coast is likely to be temporarily cut off from market.

During the twelve months ending June 30 our exports of timber to France, Germany, Italy, and the United Kingdom amounted to \$6,164,371; and sawed lumber exports were worth \$17,507,011. By far the larger part of this yearly income, which takes no count of furniture and other materials made chiefly of wood, amounting to \$23,671,382, or nearly two millions of dollars a month, is going to be lost to American producers while war continues.



LOADING ROSIN IN STEAMERS FOR FOREIGN PORTS AT SAVANNAH, GA.

IN NAVAL STORES THE SOUTH LOSES HEAVILY BY CURTAILMENT OF SHIPMENTS DUE TO THE WAR. A COMPARISON OF THE FIGURES OF TOTAL PRODUCTION WITH THOSE OF EXPORTS TO THE COUNTRIES NOW ENGAGED IN WAR SHOWS THAT BY FAR THE GREATER PROPORTION OF NAVAL STORES PRODUCED HAS BEEN GOING TO THEM.

In naval stores again the south loses heavily. Austria, Belgium, Germany, Italy, Russia, and the United Kingdom take rosin worth \$7,598,233, and turpentine valued at \$4,719,781, a total of \$12,318,014. Most of this will be cut off from market, for Germany alone takes \$4,823,815 worth, and commerce with Germany does not now exist. France, being a producer and exporter of naval stores, does not take our southern product. The latest figures (1909) on the total production of rosin give 3,263,857 barrels, valued at \$12,576,721. In that year the total production of turpentine was 28,988,954 gallons, valued at \$12,654,228. There can be no doubt that since these Census figures were gathered the quantity of rosin and turpentine produced has fallen off and the value has increased. A comparison of the figures of total production with those of exports to the countries now engaged in war shows that by far the greater proportion of all naval stores produced has been going to them.

Nearly all our hardwood exports go to Europe, and principally to those countries now engaged in war. In this connection it is interesting that a large part of our walnut—and the very choicest—has been going to the present belligerents, and mainly to Germany, to be made into gun stocks. Here again the South suffers, in commerce if not in production, because New Orleans is the principal source of hardwood exports. Proportionately, the hardwood industry is the hardest hit of all southern lumber, because such a large part of the product depended on the export market. A single example, that of the vast export of oak barrel staves to hold French wine and German beer, is sufficient to indicate what war is doing.

The conditions arising out of difficulties in transportation are only indicated in the foregoing paragraphs, which are intended to be merely suggestive.

PEACE DEMANDS CUT OFF

In countries at war the arts of peace are at a standstill. The building of homes will cease, large projects of con-

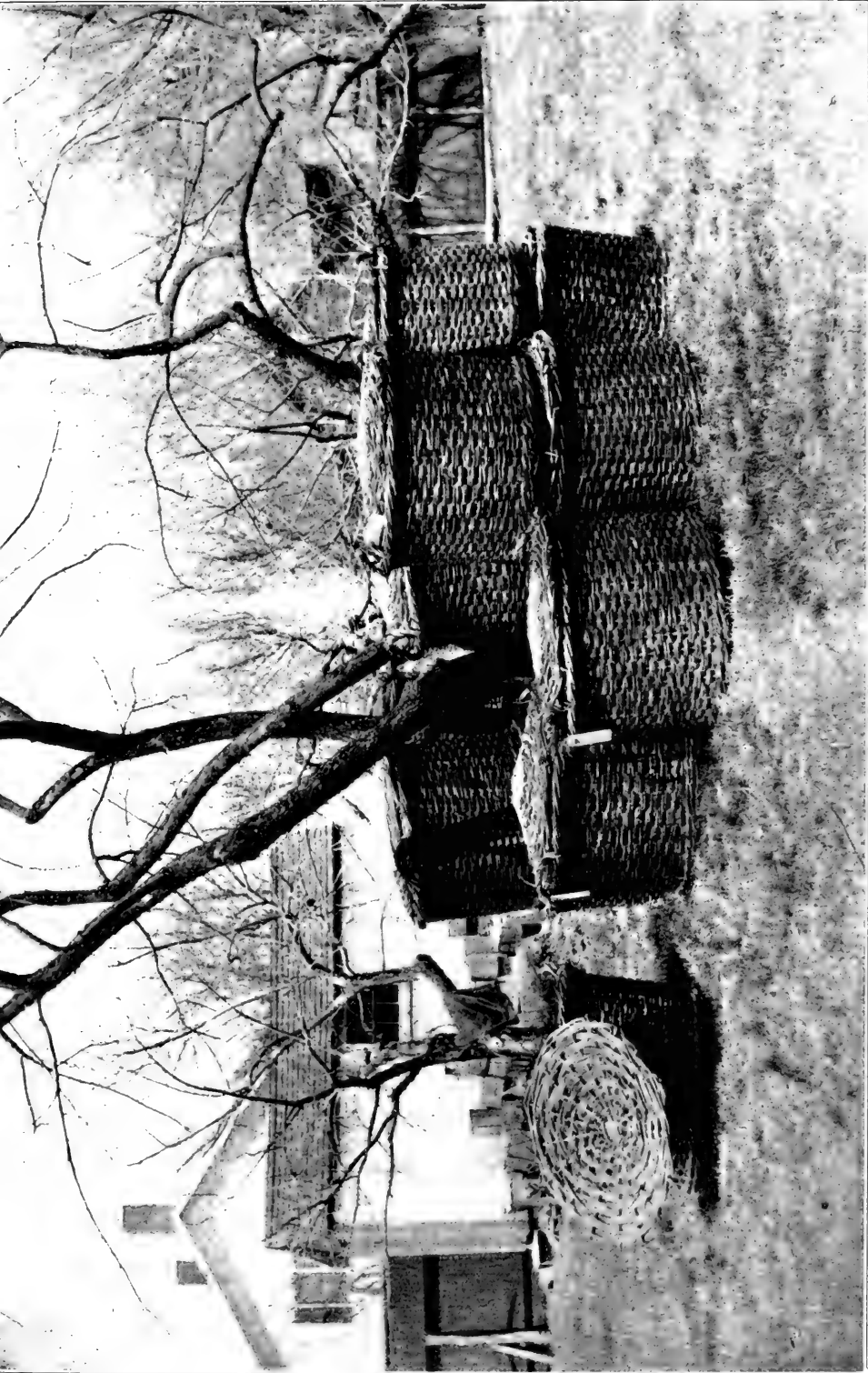
struction will be abandoned, and the demands for timber will naturally fall off. England has been experiencing great activity in the building trades. The *Timber Trades Journal*, of London, says, "Of course, the 'boom' in the housebuilding trade will receive a severe check; first, because few will continue to spend money on speculative enterprises of this sort, and secondly . . . the stocks in this country will be insufficient to meet any large demand for building timber. The Government also will scarcely be able to press on with its social programme, and the Housing Bill will either be postponed or abandoned."

Continental business is paralyzed and all sorts of public works have been abandoned.

So, even aside from crippled commerce, the normal demands of peace are at a standstill. Even though all the timber required for military operations might be transported without risk, the quantities used would not begin to compensate for the vast decrease in building and manufacturing in those countries actively at war.

DEPRESSING EFFECTS AT HOME.

All this curtailment of foreign markets, the greatly augmented risks of foreign shipments, and increases in costs of transportation and insurance, mean over-production at home, or an entire cessation of activity such as has already taken place in parts of the south which have been supplying the export trade. The *Southern Lumberman*, while granting that one-tenth of the southern pine cut is exported, says "it is no killing matter even if the whole of these exports be wholly stopped for a few months." But the mills which supply this tenth will take little comfort from the statement, particularly in connection with that "if." All except the most sanguine authorities think the war is quite as likely to be an affair of a year or more, as of a few months. The *Southern Lumberman* journal takes a fairly hopeful view, but much of its hopefulness depends on certain "ifs," which are ever



GERMAN SEEDLINGS FOR EXPORT.

LARGE QUANTITIES OF THESE FOREST SEEDLINGS ARE EXPORTED FROM GERMANY TO THE UNITED STATES AND THE WAR HAS RESULTED IN THE COMPLETE ELIMINATION OF THIS INDUSTRY.

the hinges on which the gate of destiny swings. However, it says that "the best possible thing for the lumber manufacturer to do in every branch of the trade is to reduce production as much as possible without disruption to the business, or the causing of real suffering to their employees."

But the biggest depressing effect at home comes through the general uncertainty, and through the difficulty in

us at the end of a sprint, but at the end of a waiting race, with lots of headwork in it—a veritable Marathon. We have got to plan ahead and to look at all sorts of solutions.

America's neutrality is going to help mightily in the final adjustment. Great Britain's neutrality during the Franco-Prussian war helped her trade increase by leaps and bounds at the expense of the belligerent powers. The countries



BLACK WALNUT GUN STOCKS FOR GERMANY.

IT IS INTERESTING TO NOTE THAT A LARGE PART OF THE BLACK WALNUT CUT IN THE UNITED STATES HAS BEEN GOING TO GERMANY WHERE IT IS USED AS GUN STOCKS.

getting money. This, of course, is a world-wide condition, and affects us no more than it affects other nations. But that does not make the influence on our domestic business any less profound; and any immediate increase in lumber consumption at home is not to be expected.

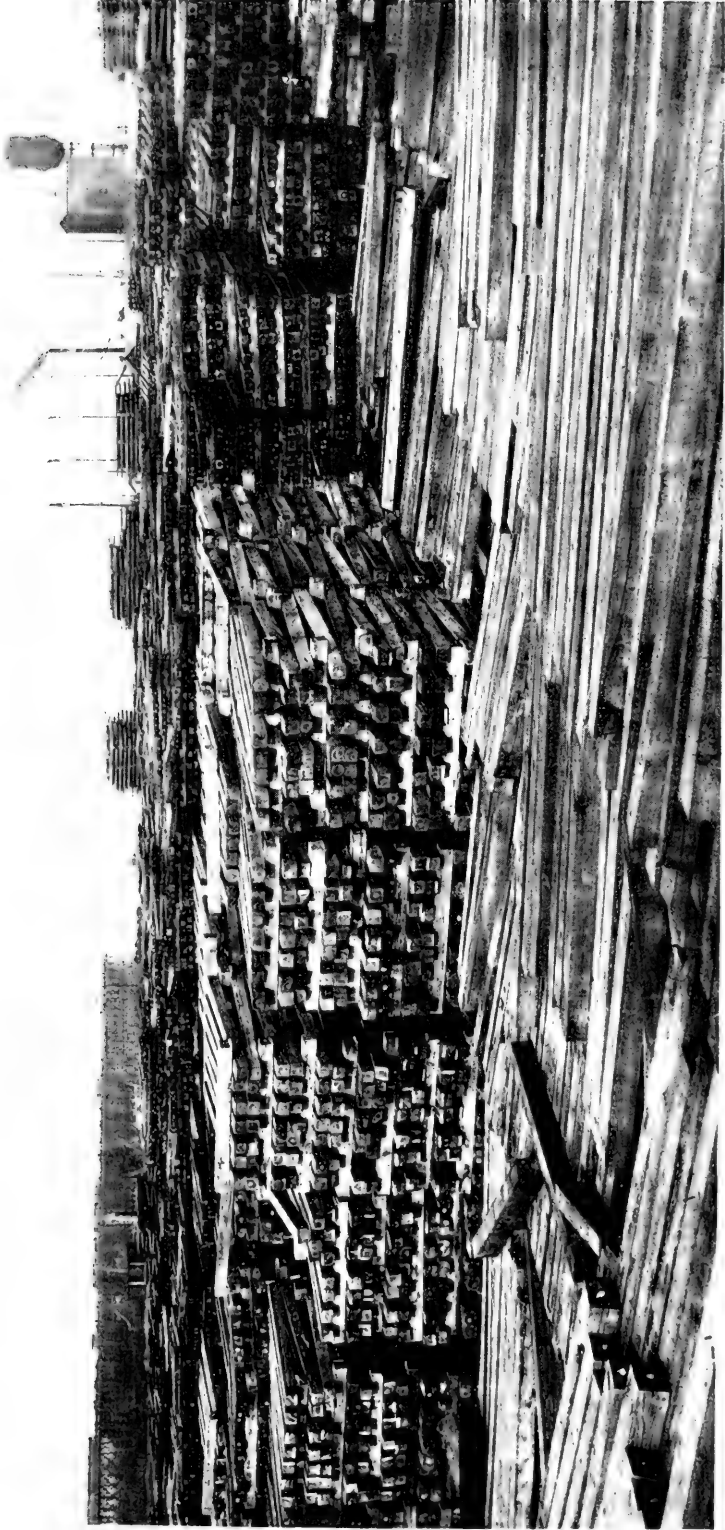
STIMULATING EFFECTS OF WAR.

With characteristic optimism, however, Americans are looking for the stimulus which the European war will bring about. Immediate good effects are not visible; nor are they likely to come soon. The prize is not coming to

now in conflict cannot engage in manufacture and commerce except to supply means of their own subsistence and carrying on their warfare. The United States is having no such devastating effect upon its machinery of production and supply. We are not in the position of keeping hands off simply to benefit our commercial interests, but that fact should not keep us from looking forward to securing such benefits.

NEW OUTLETS FOR TIMBER.

There is little to hope for in the way of war demands for timber from countries now involved in the European



CROSS TIES SEASONING IN A RAILROAD YARD.

MILLIONS OF THESE TIES ARE NOW PILED IN RAILROAD YARDS IN THE UNITED STATES AWAITING PRESERVATIVE TREATMENT AND AS THE SUPPLY OF CREOSOTE OIL FROM GERMANY IS CUT OFF THEY MAY HAVE TO BE USED WITHOUT BEING TREATED. TREATMENT TRIPLES AND QUADRUPLES THEIR LIFE.



SCENE IN A GERMAN FOREST.

AMERICAN FOREST STUDENTS WHO ANNUALLY GO TO GERMANY IN LARGE NUMBERS TO STUDY MODEL FOREST CONDITIONS MAY FIND THE WAR HAS RESULTED IN GREAT DESTRUCTION OF THE FORESTS.

struggle, or indeed in all Europe. It behooves us, then, to look for new outlets. Heretofore Germany has had a large share of the South American trade, particularly with Argentina and Brazil. These countries are still going to need material, and the United States now has an opportunity not only to enter the field, but to cover it.

This subject is worthy of the closest study by all the agencies that can be brought to bear on it, and the lumber industry should take a large share in the study.

The possibility of developing an export trade in mine timbers is indicated by Consul Lorin A. Lathrop, of Cardiff, Wales, who says:

"The coal mines in the South Wales field are timbered with the trunks of 20-year-old fir trees, imported principally from France. So many woodcutters have been withdrawn by French mobilization that there is danger of shortage of the supply. Prices have risen from \$5 to \$7.50 per measured ton, ex-ship, within a week." Consul Lathrop also says that efforts are being made to secure, through official chan-

nels, a release by the French Government of sufficient woodcutters from military and naval service to maintain supplies, but as France is rushing every available man to the front this effort is not at all likely to be successful. This being the case the market is apparently open to the United States.

The war should boom the pulp and paper trade in the United States and Canada and the *Paper Trade Journal*, of New York, in a letter to AMERICAN FORESTRY under date of August 27, is most optimistic, saying:

"There has developed an extraordinary demand for paper of all kinds in the domestic market, and from Europe and South America. Our mills will be taxed to their utmost capacity, and yet will not be able to meet it without further equipment. Every old mill in the country will be requisitioned and fancy prices will prevail. The position of the world's market is indicated by the following cable received by the Trade and Commerce Department of Ottawa, Ontario.

"Large Bordeaux newspaper with daily circulation of 150,000 willing to

purchase \$20,000 print paper, payment conditions determined later. Please obtain quotations, Havre or British port."

"This is a sample of many appeals reaching this market daily. In London it is a case of *paper at any cost*. The United States and Canada are the only available sources of supply, and *paper is not contraband*. Our mills will be obliged to enlarge their equipment to meet the situation."

What seems to be one of the best opportunities for enlarging American outputs is that of supplying the products usually imported. Germany, for example, in the twelve months before July 1, supplied some 150,000,000 pounds of wood pulp, valued at more than two and one-half millions of dollars. This was of kinds we could just as well produce in this country, according to investigations of the Forest Service laboratory at Madison. Norway and Sweden furnished about forty-five million pounds, valued at more than eight millions. Our own mills will have to make up for this, because little of it is likely to come here.

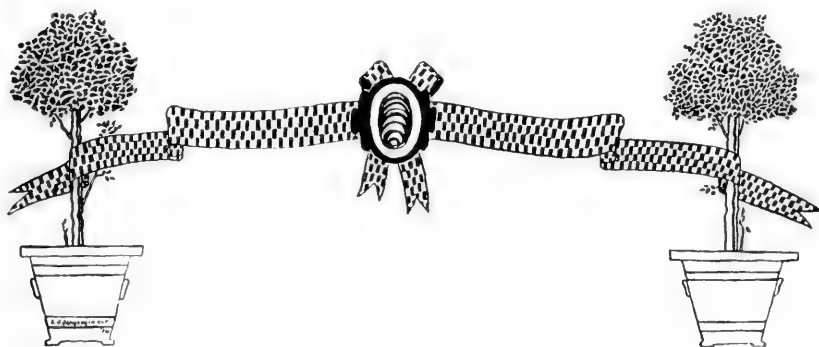
Cabinet woods, except those directly from Central and South America, have come mainly through Great Britain, which shipped to us last year more than one and a half million dollars' worth. We don't grow Circassian walnut, it is true, but we do grow many handsome finishing woods; of these we should

and could use more. Some, of which red gum is a notable example, are growing in popularity and use. Possibly a dearth in the supply of some foreign woods will lead us to consider more carefully the possibilities of our own.

Newspapers have pointed out that Germany normally supplies some twelve million dollars' worth of potash, used as fertilizer, and in the arts, and that this supply will cease, at least for the present. It is mainly a mineral product, but chemists are suggesting that where large quantities of wood ashes are available, as at the waste burners of big sawmill plants, the demand for such a product may make a source of profit from the leached ashes.

Here again, these examples are held out as a few suggestions. Many others, not within the space or scope of this article are possibilities.

On the whole, however, immediate benefits will not accrue to the lumber industry in America as a result of the stupendous and regrettable struggle in Europe. During the continuation of the war there is likely to be marked depression, and the war will not soon cease. But the longer it lasts, the more chance will the lumber business of the country have to make adjustments independent of the European states, and when the peace comes the United States will be in the best position to profit by it.





GERMAN FORESTRY STUDENTS.

A GROUP AT THE UNIVERSITY OF MUNICH, TOGETHER WITH PROF. SCHUPFER, DR. EADRES, AND PROF. FABRICIUS. THE FORSTMEISTER HAPPAK OF THE KRAMSACH FOREST, STANDS IN THE FRONT ROW, WEARING THE TYPICAL MOUNTAIN COSTUME.

THE BAVARIAN FORESTER

By G. H. COLLINGWOOD.

[This article was written in Munich, Germany, by Mr. Collingwood, just before the outbreak of the war. Since that time a number of the Bavarian forest employes have joined their commands and have seen some brisk campaigning. Several Bavarian regiments were in the hard fighting in Alsace-Lorraine. The higher forest officials are exempt from military service, except in cases of extreme need. Whether any of them have been called to the front or are now under arms is not known.—EDITOR.]

IN GERMANY the possibility of a Ranger raising through the various stages of the Forest Service to that of Supervisor or District Officer is quite out of the question, for from the very beginning of their education the two officers follow along different courses. To be sure, they may both start in the public school together, but after four years in the Volksschule, as it is known, the future Forstmeister leaves to go into the gymnasium, while the future Ranger, or Förster as he is known in Bavaria, remains three years longer in the Volksschule. He who hopes to be a Forstmeister must first choose parents who

can afford to give him the required education, and help support him for several years after he has secured a position in the government Forest Service. In fact in Prussia there is a law which makes it necessary for a young forest man to have a sufficient income to make him financially independent during the first twelve years after leaving the Academy or University.

The boy who leaves the Volksschule at the end of his fourth year to enter the gymnasium must remain there nine years before finishing. Forestry work, even in Germany, does not require any deep knowledge of Latin and Greek, so

he usually enters the Oberreal gymnasium which corresponds to a rather practical grammar school. Here he receives his mathematics, German literature, botany, drawing, and perhaps English and French. He is then ready to enter the Forestry Hochschule of the University. This word "Hochschule" is rather confusing to the average American, but it corresponds most nearly to a college of a university. But here is the great difference between the German system and ours of America, for in Germany the student is allowed to take one semester's work in one university or academy and one in another, and receive credit for all at the particular place where he wishes to finish. Only in the University of Munich it is required that at least half of the time be spent there. Thus a man who is particularly interested in some special phase of Forestry is able to study under several different professors in as many different institutions, and to receive credit for all of his work.

A middle examination covering chemistry, botany, geology, mathematics and elementary forestry is held at the end of the first two years, and a final at the end of the full course of four years. Upon passing the final examination he is capable of entering the Forest Service as a Praktikant. In Bavaria the Herr Praktikant serves for three years, and during the first year he receives no salary. He is directly under the Forstmeister and is about the forest with him at all times. He becomes thoroughly acquainted with the whole forest,—the trees and plants upon it, and the various systems of managing the different areas. He is often questioned by the Forstmeister as to what he would do with this or that area under certain given conditions.

Naturally, the ideal Forstmeister in a case like this, is something between a tutor and an advisor. During the last two years he is given much work to do,



THE HERR FORSTER AT VALEPP
A TYPE OF THE BAVARIAN RANGER.

either in the office on the various reports, or in the field surveying. During this work he receives about \$1.00 per day.

After his three years as Praktikant he is again subject to an examination, this one continuing for two weeks, and

upon which passing allows him to enter into active work as a Geprüfter Praktikant, beginning at a salary of \$450.00 per year. He occupies this position for two or three years, during which time he does much the same work as he did during the year before taking the examination. He is then raised to the position of Assessor, beginning at \$750.00 per year, and with a possible increase to as high as \$1,500.00. The position of Assessor seems to have a variety of duties. He may be an Assessor in active work, and perhaps be given complete charge of a small area of a thousand or more acres, or he may be an office Assessor where he is more in the nature of an especially trained technical stenographer.

The position of Forstmeister, which corresponds to that of a Supervisor is the next round on the ladder; of promotion, and for many it is the highest. It is seldom that a man reaches this position before the age of 35 or 40 years; he starts in at a salary of \$1,200.00 and progresses to as high as \$1,800.00. A Forstmeister in Bavaria has control of from 10,000 to 50,000 acres, with a force of two or three technical men, and four to ten Försters, depending upon the size of the forest, besides the wood choppers and ordinary laborers who are seldom on for more than six months at a time. Naturally with a force like this upon a comparatively small area, they are able to carry on a very intensive system of Forestry, which at the present time is quite out of the question in America, especially in our big western forests.

About the Forstmeister there are the men in the Ministerium, or Central Office. In Bavaria the Ministerium is in Munich, and each man is known as a Forstund Regierungsrat. They are

chosen from among the most capable of the Forstmeisters, and their work keeps them for the most part in the city, where they receive a salary of from \$1,500.00 to \$2,100.00 per year.

Now, to go back to the time of sep-



UNTRAINED WOODS' WORKERS ON ONE OF THE HIGH MOUNTAIN FORESTS.
THESE MEN WORK ONLY DURING THE SUMMER.

aration and segregation at the end of the fourth year in the Volksschule, the young, future Förster follows along a different course of study, and is capable of earning his living at a much earlier age. To be sure, he has no hopes of ever being a Forstund Regierungsrat with a possible salary of \$2,100.00 per year, or even a Forstmeister. The young



A FOREST NURSERY NEAR FREISING, BAVARIA.

BESIDES FURNISHING MOST OF THE MATERIAL NECESSARY FOR PLANTING THE FREISING FOREST, THIS NURSERY CONTAINS A CONSIDERABLE COLLECTION OF AMERICAN SPECIES, WHICH ARE BEING EXPERIMENTED WITH IN GERMANY.

Förster continues in the Volksschule for three years longer, completing his course there. He is then ready to enter the Waldbauschule where he spends four years. In Bavaria there are five of these schools, where the student learns all that is considered necessary for a German Förster. Naturally, in a land where so much planting is done the chief stress is laid upon the silvicultural side, and the preparation and care of nurseries and nursery stock is taught thoroughly. There are, of course, other subjects taught besides Silviculture, and this includes botany, mathematics, and a certain amount of German necessary in the preparation of reports. Somewhere in this period he must serve his two or three years in the army, the length of time depending upon what branch of the service he enters. Those who receive the gymnasium training are partially exempted from military service, and are only required to serve one year.

At the end of his four years in the Waldbauschule he is ready to take an examination which upon passing allows him to enter the State Forest Service as a "Forstschutz-dienstaspirant." This compares most nearly with a guard upon an American forest, only the German is willing to serve under this title for three years at an uncertain salary of little or nothing which varies according to the work in hand. After serving these three years there is another examination waiting for him which makes him eligible to serve as a Forstassistent at \$25.00 per month, and with a possible increase to \$37.50 per month. This position corresponds to that of our Assistant Ranger, and the promotion to Förster or Ranger is based upon merit. The Förster has the work on a District much the same as a Ranger, only with very much less responsibility, and on a much smaller area, for on a forest of 20,000 to 30,000 acres there are usually at least four or



THE FÖRSTERS' HOUSE AT VALEPP, BEI TEGERN SEE.

THIS IS NOT ONLY A HEADQUARTERS FOR THE RANGER, BUT A WELL MANAGED HOTEL, OR TAVERN AS WELL. THE ORDINARY WORKERS ARE HOUSED IN THE SMALL HOUSE IN THE RIGHT-HAND FOREGROUND.

five Försters. Their work is naturally of a far more intensive nature, but requiring much less physical endurance and judgment than that of the Ranger. It consists chiefly of overseeing a few women in a woods nursery, or out in the forest in some planting operation. To the American who meets a Förster for the first time he is usually a source of considerable surprise. For he often appears as quite dapper in his green suit and white collar, and with usually a feather in his hat. In the high mountain forests he usually wears the picturesque and very practical light jacket, short leather breeches, and woolen quarter socks. Over his shoulder may be slung a shotgun, or combination shotgun and small caliber rifle, and very often he leads a little squatty dachshund which hurries along at his side. But in no case are his hands too full, or his shoulders too heavily laden, for him to take off his hat to the Forstmeister when they meet, and to carry his raincoat and any bundles which he may have. His is a job of supervising others not as fortunate as himself, and of being supervised by the Forstmeister. At the end of several years of faithful service this man may receive the sum

of \$900 per year, and of course if he lives long enough he will receive a pension.

Those who work under the Förster, or the Arbeiter, are not supposed to be educated. They seldom have work for more than six months in the year, although there is usually an agreement of some kind by which they are insured work from year to year. The wood choppers are the best paid, their wages being usually based upon piece work, and at times they earn as high as \$1.50 to \$2.00 per day. They are usually big broad-shouldered peasant boys, who look especially strong and picturesque in their short leather breeches and woolen quarter socks, which leave the heavily muscled knees and ankles tanned and exposed to the weather. Then there are the ordinary workers who are often older men who do the roadwork and lighter work in the woods. These men get from 75 cents to \$1.00 per day. On nearly every forest there are women who do the planting and nursery work, and in the fall go through the forest smearing the tips of the young transplants with a black composition made partially of beef blood, which helps to



HOW ALL OF A TREE IS USED.

A SMALL CUTTING AREA, WHICH HAS OPENED UP A SMALL PART OF THE FOREST, SHOWS THE DISPOSAL OF THE ENTIRE TREE. THIS IS COMPARATIVELY HIGH MOUNTAIN FOREST, CHIEFLY SPRUCE, AT AN ELEVATION OF 2,600 FEET ABOVE SEA LEVEL.

keep the deer from nibbling the tips. In wood's work as in nearly all other work the women must content themselves with less pay, so here it ranges from 60 cents to 75 cents per day. Out of this there are the inevitable German insurance fees to pay. The worker who receives 75 cents to \$1.00 per day must

pay 10 cents per week into a sickness fund, and 2 per cent of his daily wage into an old age and disabled pension fund. If at the end of fifteen years he is disabled he receives \$20.00 per year, at the end of twenty years it is \$40.00, and at the end of thirty years it is \$50.00.



THE WORLD'S GREATEST WOODLOT

By GEORGE S. LONG.

THERE are native to the Pacific slope states about one hundred species of true forest trees, not counting low shrub forms, and of these nearly forty species, or over a third, have established commercial value. From the ordinary lumbering standpoint, about fifteen species are of high importance because of both quantity and quality and perhaps five more are cut when found in mixture with them. The other kinds classed above as commercial are rarer, or used only for special purposes, and do not enter into ordinary lumber stocks.

While a few important species are confined to particular localities, like the redwood of the California coast counties and the Port Orford cedar of southwestern Oregon, others occur wherever climatic conditions suit their peculiar requirements and a third still more adaptable class, like Douglas fir and western yellow pine, range throughout the entire West except upon deserts and mountain tops, although finding certain conditions more favorable to their highest development. For these reasons, and particularly because there are few extensive areas maintaining uniform conditions particularly suited to one, pure stands of any one species are rare. The forests of the west present a succession of varying mixture-types, perhaps dominated in certain regions by one or more species but often shading into another type almost imperceptibly with changing altitude or climate.

The western slope of the Rockies is typically a western yellow pine and Engelmann spruce forest, the spruce succeeding the pine at higher, moister altitudes. The same red or Douglas fir that grows to immense size on the coast is scattered through it, but of small size or value. Alpine members of the white pine family occur but are not commercial. At the foot of the mountains,

making a transition into sage brush, are areas of juniper trees too small to saw but valuable for fuel and posts. Under certain mountain conditions, especially where fire has discouraged the yellow pine, lodgepole pine is abundant, and although little used for lumber, affords ties and mining timbers.

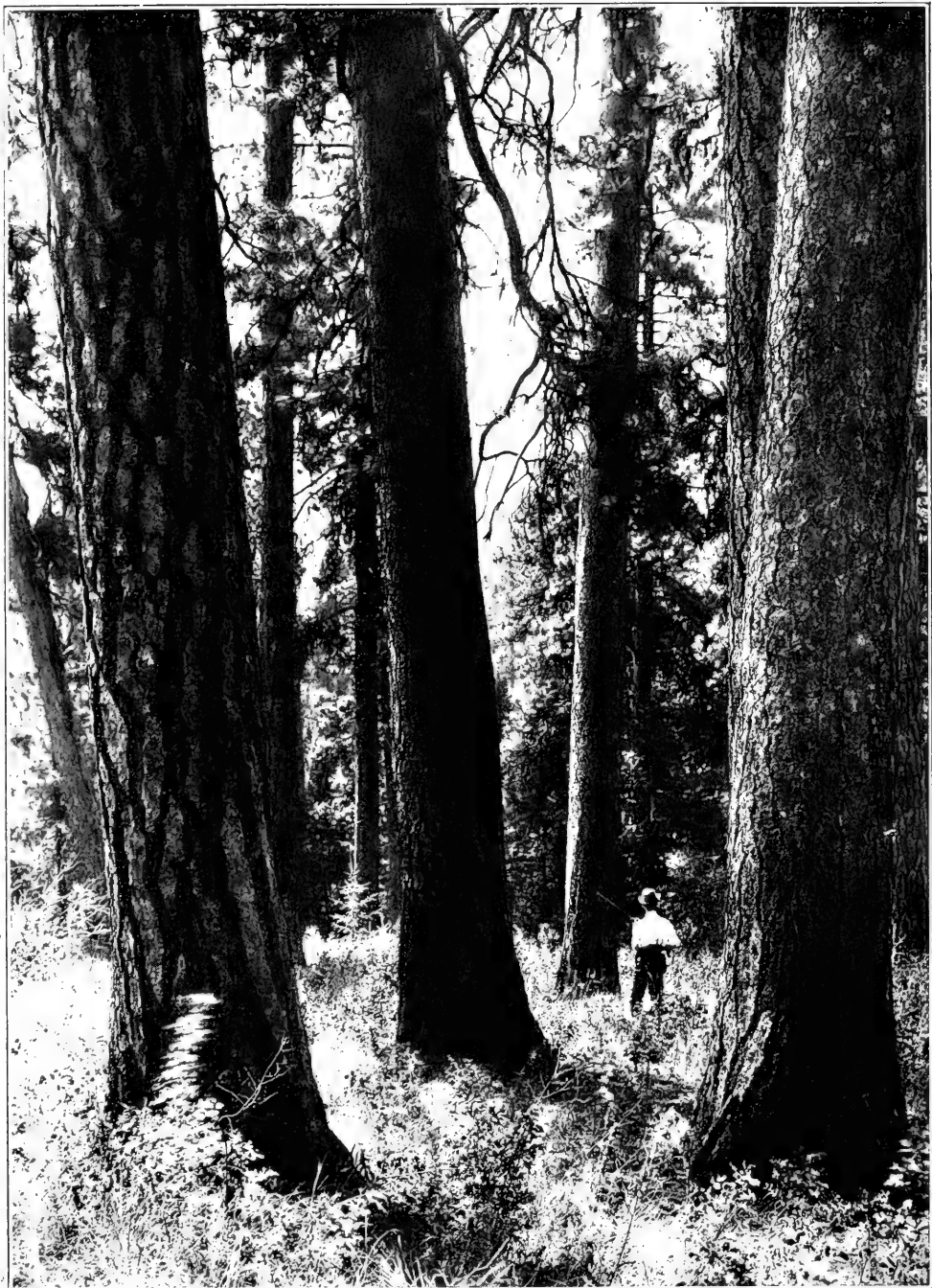
Just as in the southern part of the Rocky Mountain region, in Arizona and New Mexico, western yellow pine predominates (the Flagstaff region in Arizona is said to have the largest absolutely unbroken pine forest now extant in the world), to the northward through Wyoming and into Montana lodgepole pine becomes a more important component of the whole. Utah and southern Idaho are also in this Rocky Mountain type of varying pine and spruce forest of which but one species, western yellow pine, is a thoroughly excellent tree for universal purposes, but which is all valuable for local and special use and as a protector of a great watershed.

Northern Montana and Idaho are unique in being the meeting ground of Rocky Mountain and Pacific coast forest conditions, for wide arid areas prevent such a meeting in the states farther south. Here all the species described above are found, while cedar and hemlock testify approach to the moister climate of the coast. From the lumberman's standpoint, however, it is none of these outposts from either side that make the region interesting but the dominance of the two species that find here their highest development—western white pine and larch, or tamarack. The latter grows on dryer soils, mixed with red fir or yellow pine. The fresher situations bear magnificent stands of white pine, sometimes mixed with valuable pole cedar, and this pine, although a different species to botanists, serves every purpose for which the disappearing eastern white pine is a favorite. Its rapid growth as well as its



A PRIMEVAL FOREST IN OREGON.

A TYPE OF THE NOBLE FIR, HEMLOCK AND RED FIR TO BE FOUND ON THE PACIFIC COAST.



YELLOW PINE.

THIS IS PART OF A FINE STAND IN SOUTHEASTERN WASHINGTON.

value gives the forester a particular interest in this region. The white fir of the coast, much like the eastern balsam, makes its appearance here, also hemlock, and occasionally a paper birch. The highest mountains have several alpine conifers of no commercial value.

Northeastern Washington and the east slope of the Cascades as far south as northern California, being sheltered from the Pacific rain-winds, return somewhat to Rocky Mountain conditions and bear chiefly forests of high quality western yellow pine, invaded more or less by lodgepole where recurring fires prevent yellow pine reproduction and shading into tamarack and fir at higher altitudes. Occasionally the same Engelmann spruce of the Rockies occurs in some numbers. Broad leaved trees, except the ever-present cottonwood and aspen, are lacking as elsewhere in the interior west.

The next distinct type is the famous one associated with the Pacific northwest in the minds of all lumbermen and foresters—the famous fir forests of the rainy region between the Cascade range and the sea. In nearly pure stands or mixed with cedar, hemlock, Sitka spruce, white fir and the other commercial trees in which this region is so rich, fir here reaches what foresters call the optimism of a species—its most perfect development—and this most widely useful of American trees often attains a height of 200 feet, a diameter of 8 to 12 feet, and in favored locations yields more than 75,000 feet, board measure, to the acre. Its frequent companion, western hemlock, is scarcely less magnificent in size or less valuable, being quite different from its eastern namesake. In the mountains these species mix with white pine and with the noble and amabilis firs (sometimes erroneously called larch), both woods of high value although comparatively little known, and in the highest situations is found the handsome cabinet wood, Alaska cedar.

Through this region, the moister localities produce the giant red cedar, two-thirds the nation's cedar supply coming from western Washington and Oregon. Along the coast Sitka or tide-

land spruce the largest and finest of the world's spruces, extends southward till its predominance as a special coast tree is usurped by Port Orford cedar, which in turn gives way to redwood. The Pacific northwest forest also includes, although much more sparingly in quantity and inferior in quality than the eastern hardwood regions, maple, ash, alder, laurel and oak, and the world's supply of the medicinal cascara. Paper mills use its spruce, hemlock, fir and cottonwood for pulp. Its oak is not of the highest value, but useful.

About midway southward through Oregon, the Cascade type changes again, the red fir and western yellow pine persisting but the peculiarly northern trees giving way gradually to sugar pine, incense cedar, Shasta fir, and other less important species, all making up the representative forest of Northern California. Sugar pine, the largest of the American pines and much like white pine in quality—a truly noble tree—is the most valuable. The California foothills also have several local pines of small importance.

The famous California redwood occupies a strip of perhaps thirty miles wide from the Oregon line to Santa Cruz, California, sometimes pure and sometimes containing red and white fir in mixture. The Bigtree, a close cousin, occurs only in a few groves in the southern Sierras. California is rich in oak species, including many beautiful live oaks, but few are of high lumber value. On the other hand the California tan oak, abundant on the coast of southern Oregon and northern California, produces high-grade bark for tanning and often is worth as much per acre as fairly good timber land.

Owing to the infinitely varying mixture of species and the lack of any widespread and uniform attempt to arrive at their proportion through percentage systems, it would be a rash guess even to approximate the available quantity of each of the important commercial species. Even the total is estimated differently by different authorities, not only because of varying information sources, but also because the standard of what is merchantable



THE FAMOUS REDWOOD.
VIEW IN A LARGE FOREST OF RED WOOD NEAR CRESCENT CITY, CALIFORNIA.

NAT. L. ENG. - 50



REDWOOD LOGGING.

"FALLERS" MAKING THE UNDER CUT. AFTER THIS HAS BEEN DONE AND THE BARK CUT AWAY A SAW IS USED. THIS FOREST IS NEAR CASPAR, MENDOCINO COUNTY, CALIFORNIA.

changes yearly and its future can be only a matter of judgment. We know that before a large part of our forests can be cut it will pay to use smaller and less desirable trees than can be used profitably now, but no one knows how much smaller and less desirable they can be used at the exact time they are reached by the logger of the future.

The most recent estimates of western timber are those of the Department of Commerce and Labor, which place the entire supply in Montana, Idaho, Washington, Oregon and California at 1,512,900,000,000 feet, board measure, or nearly 54 per cent of all the timber in the United States. Of this, 1,013,000,000,000 feet is in private ownership, 440,800,000,000 in National Forests, and 59,100,000,000 in state ownership, military and Indian reservations, unreserved public lands, etc. Less is known of the other western states, but the National Forests alone in Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming are said to contain ninety billion feet. Certainly the entire west has well over one and a half trillion, a figure hard to grasp by the layman unless by reflecting that the present cut of lumber in the entire United States is only about forty billion a year. This means that the five great forest states first mentioned could, without assistance and without any new growth, equal the entire nation's present lumber production for nearly forty years.

Fully one-third of this stand of timber is owned and controlled by the Federal Government and the states west of the Rocky Mountains, and in this, the World's Greatest Wood Lot, there is an united, harmonious and effective effort on the part of the Federal Forest Service, the Forestry Department of

the states and private owners to safeguard and protect this timber from its greatest enemy—forest fire.

Here also is a public sentiment alert, advanced and willing to put in practice all intelligent conservation demands, that is possible under present economic conditions.

Aside from the hardwoods, the tim-



RED FIR AND WESTERN HEMLOCK.

THIS IS A TYPICAL MIXTURE OF THESE FINE TREES IN THE BLACK HILLS, WASHINGTON.

ber suitable for lumber in the Pacific Northwest, is unsurpassed in variety, quality and adaptability for the ordinary uses to which wood products are used. The predominating wood—Fir—being undoubtedly without a rival for structural purposes, and boldly challenging all other soft woods for the beauty of its higher grades in finish.

Supplementing the Fir, are the Cedar



FOREST SCENE IN WASHINGTON.
THOUSANDS UPON THOUSANDS OF ACRES ARE COVERED WITH SUCH TREES AS THESE.

and Redwood, almost impervious to decay, and while lacking in structural strength, supply in shingles, beveled siding and exterior finish, a wood unequaled for length of life. The Spruce of the Coast region, unlike its type on the Atlantic Coast, is a giant tree, yielding a large percentage of clear lumber of great merit.

The White Pine of Idaho, in its quality, easily maintains the dignity and merit of the White Pine of Michigan, Wisconsin and Minnesota, while the so-called Western Yellow Pine, in greater abundance, is a worthy substitute for White Pine, for interior finish, box material and for ordinary structural work, while Sugar Pine, less abundant than any of the leading species, has all the merit of White Pine.

The forests of the Pacific Northwest, therefore, are notable not only because they contain more than 50 per cent of the standing timber in the United States, but also because this timber will yield a better quality of building material than has heretofore been supplied by the forests east of the Rocky Mountains.

CLASSIFICATION OF THE 100 TREES.

The most important of the trees in this world's greatest woodlot are:

Western White Pine, Sugar Pine, Western Yellow Pine, Lodgepole Pine,

Western Larch (Tamarack), Engelmann Spruce, Sitka Spruce, White Spruce, Western Hemlock, Red or Douglas Fir, Noble Fir, Redwood, Incense Cedar, Red Cedar, Port Orford Cedar.

The trees cut in mixture with the most important ones are:

Tamarack, White Fir (two species), Amabilis Fir, Shasta or Red Fir.

The trees of minor, local or special importance, and their particular uses are:

Bigtree, lumber; Alaska Cedar, finishing; Juniper (four species), posts; Alder (two species), furniture and finishing; California Laurel, cabinet and finishing; Aspen, fruit boxes; Cottonwood, boxing, pulp, etc.; Balm of Gilead, boxing, pulp, etc.; Broadleaf Maple, furniture and flooring; Cascara, medicinal; Oregon Ash, general hardwood uses; Yew, bows, paddles, etc.; Dogwood, turnery; Oak (several species), tanning and general hardwood purposes.

The non-commercial trees are: Over a dozen pines, small Alpine larches, spruces, hemlocks, firs, rare or small birches, alders, cottonwoods, maples, etc., numerous inferior oaks, sycamores, walnuts, etc. Probably sixty or more in all, some valuable in quality but too rare to consider, others common but useful only for fuel.



NATIONAL FORESTS AS RECREATION GROUNDS

By PROF. W. J. MORRILL,

Forestry Department, University of Nebraska.

A SCORE of Switzerlands in western America are inviting us to "see America first."

The National Forests of the West offer scenery equally as varied and attractive as the Alps, though different, a more delightful climate, mineral and hot springs of as much efficacy as the most celebrated ones abroad, and greater opportunities for sport.

These Forests are within a country populous with mountains. Tier rises above tier, buttressed with mighty lateral spurs, dominated by splendid peaks,

cut by beautiful, cliff-walled valleys, divided by broad plateaus. Hundreds of towering, snow-clad shafts pierce the azure sky to elevations far exceeding the highest mountains of Eastern United States.

Thousands of mountain streams well stocked with speckled trout rise within these mountain fastnesses, where the Big Horn stands sentinel on commanding pinacles, and where the mountain lion, wary of man, still takes his toll of deer, as for ages past. The spruce forests even yet hold within their shady



CAMP MARTIN, ANGELES NATIONAL FOREST, CALIFORNIA.

AN IDEAL SPOT HIGH IN THE MOUNTAINS WHICH IS A FAVORITE RESORT FOR MANY CALIFORNIANS.



A SUMMER COTTAGE.

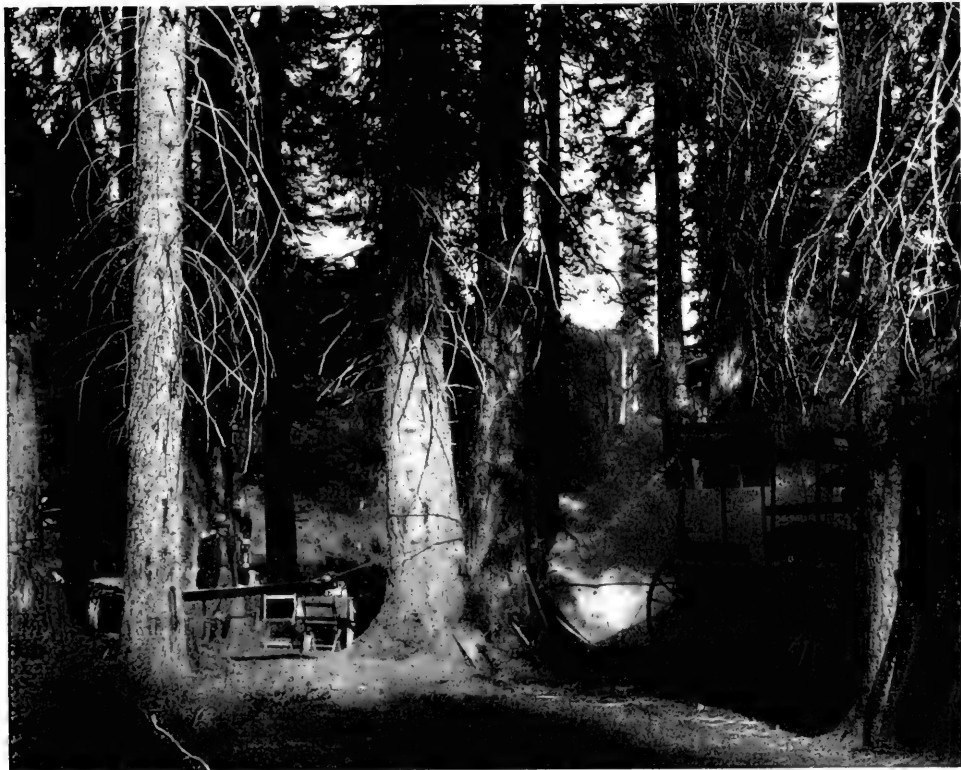
THIS IS ONE OF SEVERAL SUCH COTTAGES BUILT IN 1911, ALONG THE WATER FRONT OF PELUAN BAY, SOUTH OF ROCKY POINT ON THE CRATER NATIONAL FOREST, OREGON, UNDER THE SPECIAL USE PERMIT.

and silent depths the alluring sense of mystery and adventure, and the open, grass-floored groves of pine seem to say "tarry here." In the alpine pastures the tinkle of the bell on the "bell wether" floats dreamily across the mountain encircled basin, or the sharp, eager bark of the herder's collie is heard punctuating the protesting bleating of the sheep as this faithful guardian intelligently and undirected forces straying lambs back to the flock.

In the lower valleys or in some grassy park surrounded by forest, perhaps a herd of cattle may be seen grazing contentedly or filing solemnly away, impelled by a contagious impulse, to a watering place well known to them alone. Every turn in the winding road,

or, may be, trail presents a panorama of new and absorbing interest; in the foreground the dancing stream, boulder strewn, and marked at intervals with deep-edging pools, seems to challenge ones piscatorial skill, or else arouses more esthetic thoughts. In the distant background a fleeting glimpse through a vista of mighty fire presents in a setting of great beauty some snow-clad peak tinted with cloud reflections. In the mountain valleys the days are mild and sunny; the nights, delightfully cool, and the bracing air fortifies the visitor.

These wild regions are being used for recreation grounds to an increasing extent. It is estimated that a few years ago, when a count was attempted, half a million people paid homage to



A SUMMER CAMP.

AN IDEALLY SITUATED CAMP AMONG THE FINE TREES ON THE CRATER NATIONAL FOREST, OREGON, NEAR BROWN'S CABIN. THE CAMPING EQUIPMENT WAS TAKEN ON THE WAGON.

the attractions so lavishly afforded. Of this number no less than 100,000 visited points of interest within the Pike National Forest, in Colorado; 21,000, it is said, entered the Coconino Forest in Arizona, mostly to see the Grand Canyon within the boundaries of that Forest; 50,000 people visited the Angeles Forest; and 20,000 enjoyed the fishing, boating, camping and scenery within the Tahoe Forest, the latter two being in California, while lesser numbers found varied recreation in each of more than 40 other Forests.

It is the purpose of the National Forests to place all their resources to their highest use. Scenery is a resource, and often one that can be marred. A mountain side swept by fire leaves only the unsightly skeleton of its former glory and becomes a distressing spectacle. The streams, moreover, arising on a fire denuded water shed become erratic;

devastating floods carve away their banks and strew the narrow valley bottoms with sand and boulders, only to be quickly followed by periods of unusually low flow; good fishing declines, and the attractiveness of the country affected is impaired in every way.

While summer hotels with accommodations for the most fastidious may be found at rare intervals throughout this vast, mountainous region, the whole country is open to those who enjoy genuine camping in a country brimful of interest, grand scenery, and good sport. It appeals especially to the red-blooded American who delights in pitching his tent under the trees on the bank of some swift, clear trout stream lined with picturesque crags amid wild mountains, where the swirl of the racing waters lull him to sleep after a day crowded with interest and activity.



SKUNK CREEK CAMP.

THIS IS ON THE KANIKSU NATIONAL FOREST IDAHO, AND POSITIVELY THE ONLY THING UNPLEASANT ABOUT IT IS ITS NAME.



A FAVORITE SUMMER RESORT.

THIS IS A VACATION SPOT AT ROCKY POINT, ON RECREATION CREEK NEAR PELICAN BAY ON THE CRATER NATIONAL FOREST, OREGON, AND IS OPERATED UNDER THE SPECIAL USE PROVISION.



LAUNCH ON KLAMATH LAKE.

THE CRATER NATIONAL FOREST, OREGON, FRONTS FOR A CONSIDERABLE DISTANCE ON THIS LAKE WHICH IS A DELIGHTFUL PLACE FOR SUMMER PLEASURE.

Over all this enchanted isolation and remoteness the strong protective arm of the Government is thrown, quietly and unobtrusively. The trails one uses have been, quite likely, built at government expense, primarily to enable the Forest Ranger to patrol the extensive forests for fire protection. To him you are indebted for the guide signs at forks for trails and for the posted information concerning distances and directions to choice camping sites. Perhaps he rides to your camp. If so, you will find him thoroughly competent and willing to direct you to the chief points of interest in the vicinity. He wars against the predatory animals in order to protect the deer, elk, and mountain sheep, as well as the domestic stock, and he keeps the streams stocked with trout. Incidentally, he is also a game warden.

Many roads and bridges are built or

repaired by him and miles of telephone lines are strung to further protect the great stands of timber which clothe the mountain sides and add to the charms of the region. The Forest officer is proud of his district; he welcomes visitors, but courteously insists on the proper use of the resources. Without him deterioration of much that is attractive to the tourist would occur. In reality this tendency appeared before his advent. While the primary purpose of the National Forests is the conservation of the timber and water resources within them, in conjunction with his duties, and often directly attributable to them, the Forest officer becomes the guardian or custodian of the greatest national playgrounds. The attractions are here; they may be fully enjoyed; and the popularity of the National Forests as recreation grounds is rapidly increasing.

THE GLACIERS OF MT. RAINIER

By F. E. MATTHES, *United States Geological Survey.*

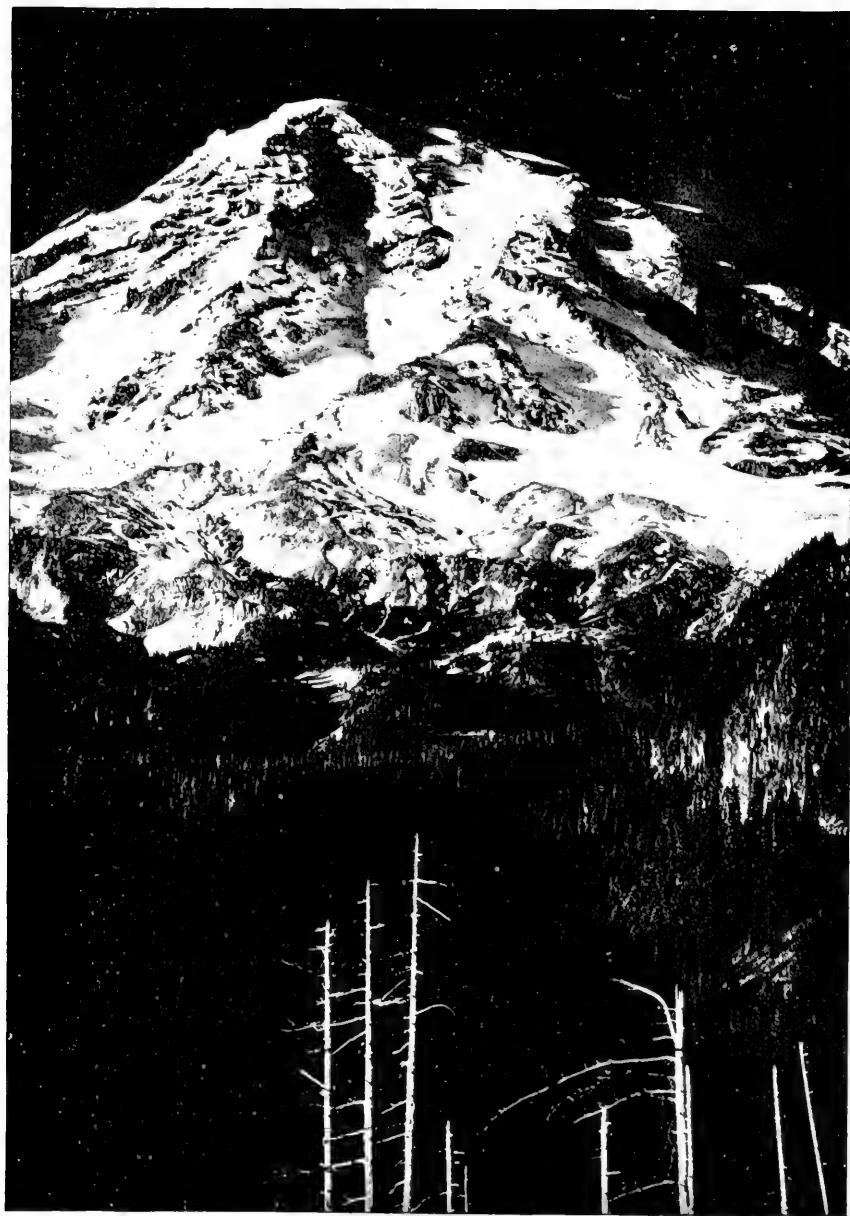
THE impression still prevails in many quarters that true glaciers, such as are found in the Swiss Alps, do not exist within the confines of the United States, and that to behold one of these rare scenic features one must go to Switzerland, or else to the less accessible Canadian Rockies or the inhospitable Alaskan coast. As a matter of fact, permanent bodies of snow and ice, large enough to deserve the name of glaciers, occur on many of our western mountain chains, notably in the Rocky Mountains, where only recently a national reservation—Glacier National Park—was named for its ice fields; in the Sierra Nevada of California, and farther north, in the Cascade Range. It is on the last-named mountain chain that glaciers especially abound, clustering as a rule in groups about the higher summits of the crest. But this range also supports a series of huge, extinct volcanoes that tower high above its sky line in the form of isolated cones. On these the snows lie deepest and the glaciers reach their grandest development. Ice clad from head to foot the year round, these giant peaks have become known the country over as the noblest landmarks of the Pacific Northwest. Foremost among them are Mount Shasta, in California (14,162 feet); Mount Hood, in Oregon (11,225 feet); Mount St. Helens (9,697 feet), Mount Adams (12,307 feet), Mount Rainier (14,408 feet), and Mount Baker (10,730 feet), in the State of Washington.

Easily king of all is Mount Rainier. Almost 250 feet higher than Mount Shasta, its nearest rival in grandeur and in mass, it is overwhelmingly impressive, both the vastness of its glacial mantle and by the striking sculpture of its cliffs. The total area of its glaciers amounts to no less than 45 square miles, an expanse of ice far exceeding that of any other single peak in the United States. Many of its individual ice streams are

between 4 and 6 miles long and vie in magnitude and in splendor with the most boasted glaciers of the Alps. Cascading from the summit in all directions, they radiate like the arms of a great starfish. All reach down to the foot of the mountain and some advance considerably beyond.

As for the plea that these glaciers lie in a scarcely opened, out-of-the-way region, a forbidding wilderness as compared with maturely civilized Switzerland, it no longer has the force it once possessed. Rainier's ice fields can now be reached from Seattle or Tacoma, the two principal cities of western Washington, in a comfortable day's journeying, either by rail or by automobile. The cooling sight of crevassed glaciers and the exhilarating flower-scented air of alpine meadows need no longer be exclusive pleasures, to be gained only by a trip abroad.

Mount Rainier stands on the west edge of the Cascade Range, overlooking the lowlands that stretch to Puget Sound. Seen from Seattle or Tacoma, 60 and 50 miles distant, respectively, it appears to rise directly from sea level, so insignificant seem the ridges about its base. Yet these ridges themselves are of no mean height. They rise 3,000 to 4,000 feet above the valleys that cut through them, and their crests average 6,000 feet in altitude. From the top of the volcano one fairly looks down upon the Tatoosh Range, to the south; upon Mount Wow, to the southwest; upon the Mother Mountains, to the northwest, indeed, upon all the ridges of the Cascade Range. Only Mount Adams, Mount St. Helens, and Mount Hood loom like solitary peaks above the even sky line, while the ridges below this line seem to melt together in one vast, continuous mountain platform. And such a platform, indeed, one should conceive the Cascade Range once to have been. Only it is now thoroughly dissected by profound, ramifying valleys, and has



THE KAUTZ GLACIER.

THIS IS A SNAKE-LIKE ICE STREAM ABOUT 1,000 FEET WIDE BUT ATTAINING A LENGTH OF FOUR MILES.

been resolved into a sea of wavelike crests and peaks.

Mount Rainier stands, in round numbers, 10,000 feet high above its immediate base, and covers 100 square miles of territory, or one-third of the area of Mount Rainier National Park. In shape it is not a simple cone tapering to a slender, pointed summit like Fuji Yama, the great volcano of Japan. It is, rather, a broadly truncated mass resembling an enormous tree stump with spreading base and irregularly broken top. Its life history has been a varied one. Like all volcanoes, Rainier has built up its cone with materials ejected

cinder cones. Successive feeble eruptions added to their height until at last they formed together a low, rounded dome—the eminence that now constitutes the mountain's summit. It rises only about 400 feet above the rim of the old crater, and is an inconspicuous feature, not readily identifiable from all sides as the highest point. In fact, so broad is the mountain's crown that from no point at its base can one see the top. The higher portions of the old crater rim, moreover, rise to elevations within a few hundred feet of the summit, and, especially when viewed from below, stand out boldly as separate peaks that



Photo by Matthes.

THE TATOOSH RANGE, FROM PARADISE GLACIER.

by its own eruptions—with cinders and bombs (steam-shredded particles and lumps of lava), and with occasional flows of liquid lava that have solidified into layers of hard, basaltic rock. At one time it attained an altitude of not less than 16,000 feet, if one may judge by the steep inclination of the lava and cinder layers visible in its flanks. Then a great explosion followed that destroyed the top part of the mountain, and reduced its height by some 2,000 feet. The volcano was left beheaded, and with a capacious hollow crater, surrounded by a jagged rim.

Later on this great cavity, which measured nearly 3 miles across, from south to north, was filled by two small

mask and seem to overshadow the central dome. Especially prominent are Peak Success (14,150 feet) on the southwest side, and Liberty Cap (14,112 feet) on the northwest side.

The altitude of the main summit has for many years been in doubt. Several figures have been announced from time to time, no two of them in agreement with each other; but all of these, it is to be observed, were obtained by more or less approximate methods. In 1913 the United States Geological Survey, in connection with its topographic surveys of the Mount Rainier National Park, was able to make a new series of measurements by triangulation methods at close range. These give the peak an

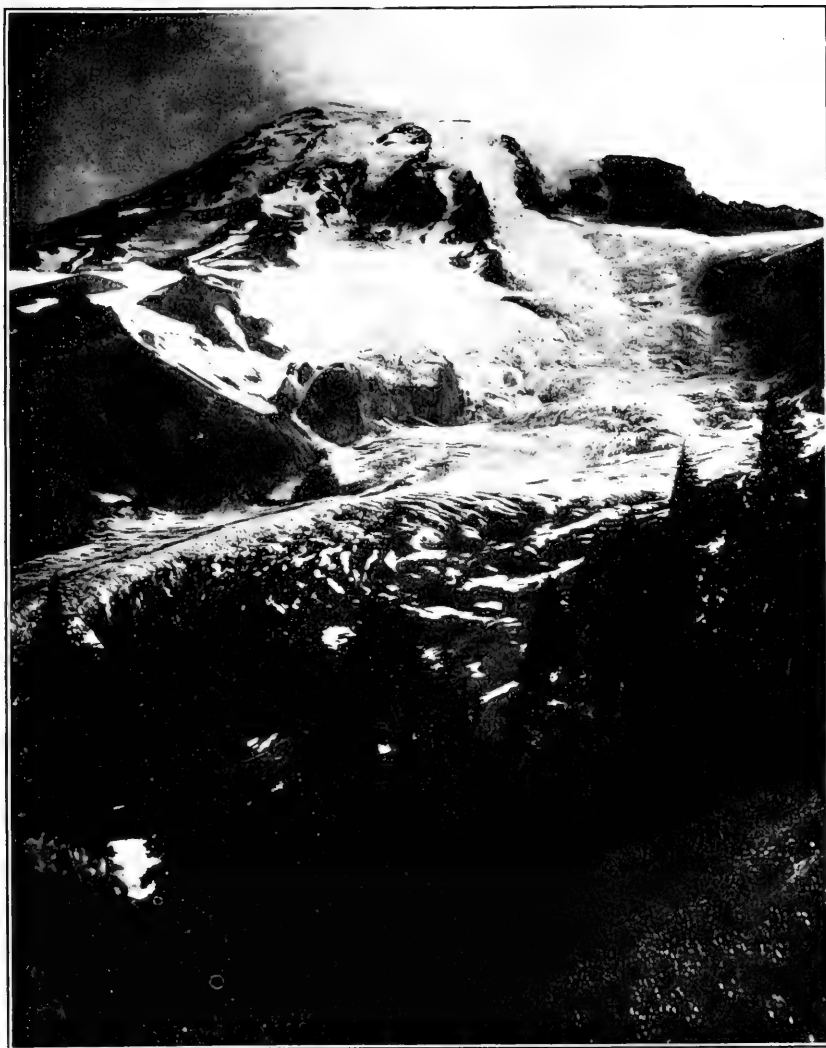


Photo by Curtis.

THE NISQUALLY GLACIER.

A GENERAL VIEW FROM THE HEIGHTS OF PARADISE PARK. THE SQUARE CUT ROCK MASS TO THE RIGHT OF THE SUMMIT IS GIBRALTAR ROCK, THE CHIEF OBSTACLE IN THE ASCENT OF THE PEAK.

elevation of 14,408 feet, thus placing it near the top of the list of high summits of the United States. Greater exactness of determination is scarcely practicable in the case of Mount Rainier, as its highest summit consists actually of a mound of snow the height of which naturally varies somewhat with the seasons and from year to year.

This crowning snow mound, which was once supposed to be the highest point in the United States, still bears the

proud name of Columbia Crest. It is essentially a huge snowdrift or snow dune heaped up by the westerly winds. Driving furiously up through the great breach in the west flank of the mountain, between Peak Success and Liberty Cap, they eddy lightly as they shoot over the summit and there deposit their load of snow.

The drift is situated at the point where the rims of the two summit craters touch, and represents the only

permanent snow mass on these rims, for some of the internal heat of the volcano still remains and suffices to keep these rock-crowned curving ridges bare of snow the better part of the year. It is intense enough, even, to produce numerous steam jets along the inner face of the rim of the east crater, which appears to be the most recently formed of the two. The center of this depression, however, is filled with snow, so that it has the appearance of a shallow, white-floored bowl some 1,200 feet in diameter. Great caverns are melted out by the steam jets under the edges of the snow mass, and these caverns afford shelters which, though uninviting, are not to be despised. They have proved a blessing to more than one party that has found itself compelled to remain overnight, on the summit, saving them from death in the icy gales.

That Mount Rainier should still retain so much of its internal heat is not surprising in view of the recency of its eruptions. It is known to have been active at intervals during the last century, and actual record exists of slight eruptions in 1843, 1854, 1858, and 1870. Indian legends mention a great cataclysmal outburst at an earlier period.

At present the volcano may be regarded as dormant and no apprehension need be felt as to the possibility of an early renewal of its activity.

In spite of Mount Rainier's continued activity until within the memory of man, its sides appear to have been snow clad for a considerable length of time. Indeed, so intense and so long-continued has been the eroding action of the ice that the cone is now deeply ice-scarred and furrowed. Most of its outer layers, in fact, appear already to have been stripped away.

From the rim points downward the ice cover of the cone divides into a number of distinct stream-like tongues or glaciers, each sunk in a great hollow pathway of its own. Between these ice-worn trenches the uneroded portions of the cone stand out in high relief, forming as a rule huge triangular "wedges," heading at the sharp rim points and spreading thence downward

to the mountain's base. There they assume the aspect of more gently sloping, grassy table-lands, the charming alpine meadows of which Paradise Park and Spray Park are the most famous. Separating these upland parks are the profound ice-cut canyons which, beyond the glacier ends, widen out into densely forested valleys, each containing a swift-flowing river. No less than a dozen of these ice-fed torrents radiate from the volcano in all directions, while numerous lesser streams course from the snow fields between the glaciers.

Thus the cone of Mount Rainier is seen to be dissected from its summit to its foot. Sculptured by its own glacier mantle, its slopes have become diversified with a fretwork of ridges, peaks and canyons.

NISQUALLY GLACIER.

The first ice one meets on approaching the mountain from Longmire Springs lies in the upper end of the Nisqually Valley. The wagon road, which up to this point follows the west side of the valley, winding in loops and curves along the heavily wooded mountain flank, here ventures out upon the rough boulder bed of the Nisqually River and crosses the foaming torrent on a picturesque wooden bridge. A scant thousand feet above this structure, blocking the valley to a height of some 400 feet, looms a huge shapeless pile of what seems at first sight only rock débris, gray and chocolate in color. It is the dirt-stained end of one of the largest glaciers—the Nisqually. From a yawning cave in its front issues the Nisqually stream, a river full fledged from the start.

The altitude here, it should be noted, is a trifle under 4,000 feet; hence the ice in view lies more than 10,000 feet below the summit of the mountain, the place of its origin. And in this statement is strikingly summed up the whole nature and economy of a glacier such as the Nisqually.

A glacier is not a mere stationary blanket of snow and ice clinging inert to the mountain flank. It is a slowly moving streamlike body that descends by virtue of its own weight. The upper

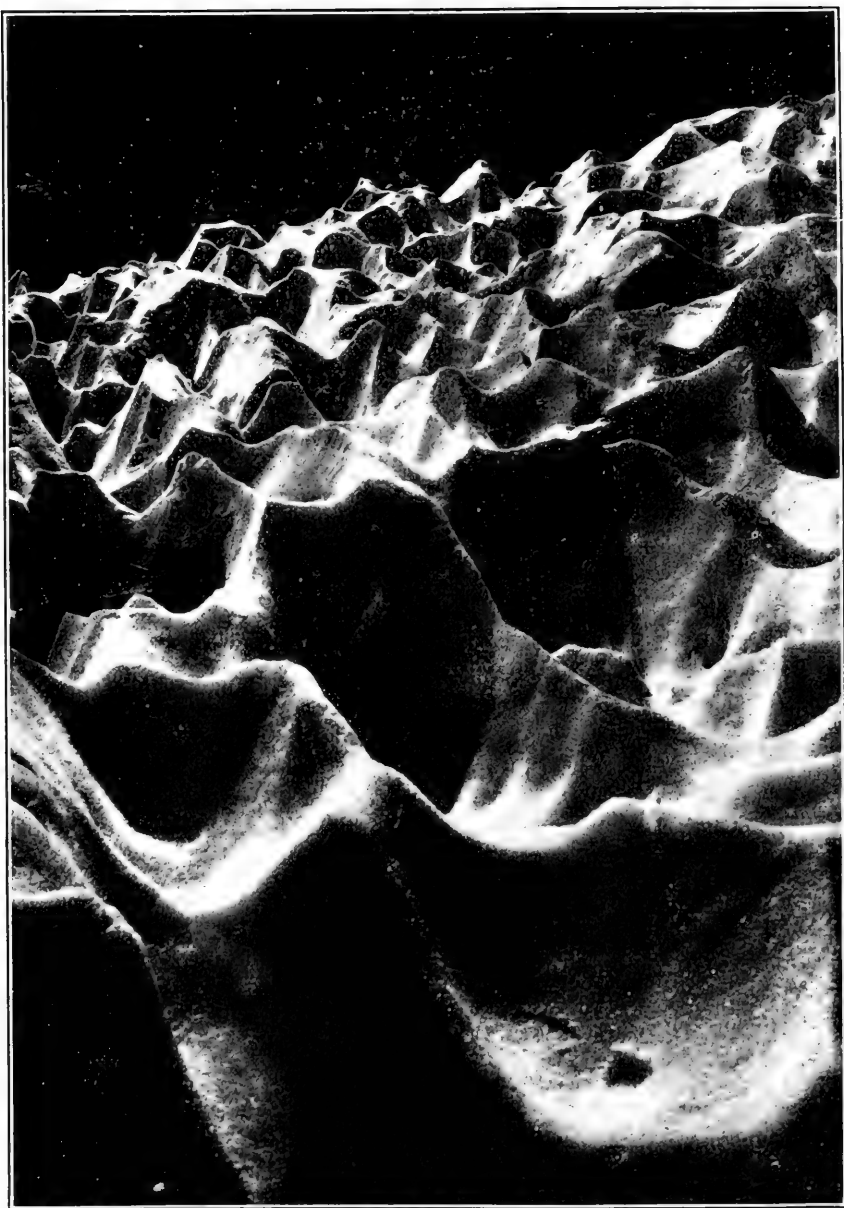


Photo by G. K. Gilbert.

SNOW CUPS AND "HONEYCOMBS."

THESE ARE PRODUCED IN A HIGH NEVE FIELD BY THE HOT RAYS OF THE SUN. THE AIR AT THESE HEIGHTS REMAINS ALMOST CONSTANTLY BELOW THE FREEZING POINT.

parts are continually being replenished by fresh snowfalls, which at those high altitudes do not entirely melt away in summer; while the lower end, projecting as it does below the snow line, loses annually more by melting than it received by precipitation, and is maintained only by the continued accession of masses from above. The rate at which the ice advances has been determined by Prof. J. N. Le Conte, of the University of California. In 1903 he placed a row of stakes across the glacier, and with the aid of surveying instruments obtained accurate measurements of the distances through which they moved from day to day. He found that in summer, when the movement is greatest, it averages 16 inches per day. This figure, however, applies only to the central portion of the glacier—the main current, so to speak—for the margins necessarily move more slowly, being retarded by friction against the channel sides.

As one continues the ascent by the wagon road a partial view of the glacier's lower course is obtained, and there is gained some idea of its stream-like character. More satisfying are the views from Paradise Park. Here several miles of the ice stream (its total length is nearly 5 miles) lie stretched out at one's feet, while looking up toward the mountain one beholds the tributary ice fields and ice streams, pouring, as it were, from above, from right and left, rent by innumerable crevasses and resembling foaming cascades suddenly crystallized in place. The turmoil of these upper branches may be too confusing to be studied with profit, but the more placid lower course presents a favorable field for observation, and a readily accessible one at that.

A veritable frozen river it seems, flowing between smooth, parallel banks, half a mile apart. Its surface, in contrast to the glistening ice cascades above, has the prevailingly somber tint of old ice, relieved here and there by bright patches of last winter's snow. These lie for the most part in gaping fissures or crevasses that run athwart the glacier at short intervals and divide its body into narrow slices. In the upper

course, where the glacier overrides obstacles in its bed, the crevasses are particularly numerous and irregularly spaced, sometimes occurring in two sets intersecting at right angles, and producing square-cut prisms. Farther down the ice stream's current is more sluggish and the crevasses heal up by degrees, providing a united surface, over which one may travel freely.

SNOWCUPS AND HONEYCOMBS.

At the high altitudes the sun heat is astonishingly intense, as more than one uninitiated mountain climber has learned to his sorrow by neglecting to take the customary precaution of blacking his face before making the ascent. In a few hours the skin is literally scorched and begins to blister painfully.

At the foot of the mountain the sun heat is relatively feeble, for much of it is absorbed by the dust and vapor in the lower layers of the atmosphere, but on the summit, which projects 2 miles higher, the air is thin and pure, and lets the rays pass through but little diminished in strength.

The manner in which the sun affects the snow is peculiar and distinctive. Instead of reducing the surface evenly, it melts out many close-set cups and hollows, a foot or more in diameter and separated by sharp spires and crests. No water is visible anywhere, either in rills or in pools, evaporation keeping pace with the reduction. If the sun's action is permitted to continue uninterrupted for many days, as may happen in a hot, dry summer, these snow cups deepen by degrees, until at length they assume the aspect of gigantic bee cells, several feet in depth. Snow fields thus honeycombed may be met with on the slopes above Gibraltar Rock. They are wearisome to traverse, for the ridges and spines are fairly resistant, so that one must laboriously clamber over them. Most exasperating however, is the going after a snowstorm has filled the honeycombs. Then the traveler, waist deep in mealy snow, is left to flounder haphazard through a hidden labyrinth.

Of interest in this connection is the great snow cliff immediately west of

Gibraltar Rock. Viewed from the foot of that promontory, the sky line of the snow castle fairly bristles with honeycomb spines; while below, in the face of the snow cliff, dark, wavy lines, roughly parallel to the upper surface, repeat its pattern in subdued form. They represent the honeycombs of previous seasons, now buried under many feet of snow, but still traceable by the dust that was imprisoned with them.

tribution of the glaciers on the cone. By far the greater number originate in the vicinity of the 10,000-foot level, while those ice streams which cascade from the summit, such as the Nisqually are in a sense reborn some 4,000 feet lower down.

PARADISE GLACIER.

A striking example of an ice body nourished wholly by the snows falling on the lower slope of Mount Rainier is



Photo by Curtis.

GENERAL VIEW OF PARADISE GLACIER.

THE ICE BODY ORIGINATES ENTIRELY BELOW THE 9,000-FOOT LINE. MORE SNOW FALLS AT THESE RELATIVELY LOW LEVELS THAN ON THE SUMMIT OF THE PEAK.

It is between the 8,000 and 10,000 foot levels, that one meets with the conditions most favorable for the development of glaciers. Below this zone the summer heat largely offsets the heavy precipitation, while above it the snowfall itself is relatively scant. Within the belt the annual addition of snow to the ice fields is greater than anywhere else on Mount Rainier. The result is manifest in the arrangement and dis-

tribution of the glaciers. In no wise connected with the summit névés, it makes its start at an elevation of less than 9,000 feet. Situated on the spreading slope between the diverging canyons of the Nisqually on the west and of the Cowlitz on the northeast, it constitutes a typical "interglacier," as intermediate ice bodies of this kind are termed.

Its appearance is that of a gently undulating ice field, crevassed only toward

its lower edge and remarkably clean throughout. No débris-shedding cliffs rise anywhere along its borders, and this fact, no doubt, largely explains its freedom from morainal accumulations.

The absence of cliffs also implies a lack of protecting shade. Practically the entire expanse of the glacier lies exposed to the full glare of the sun. As a consequence its losses by melting are very heavy, and a single hot summer may visibly diminish the glacier's bulk. Nevertheless it seems to hold its own as well as any other glacier on Mount Rainier, and this ability to recuperate finds its explanation in the exceeding abundance of fresh snows that replenish it every winter.

The Paradise Glacier, however, is not the product wholly of direct precipitation from the clouds. Much of its mass is supplied by the wind, and accumulates in the lee of the high ridge to the west, over which the route to Camp Muir and Gibraltar Rock is laid. The westerly gales keep this ridge almost bare of snow, permitting only a few drifts to lodge in sheltered depressions. But east of the ridge there are great eddies in which the snow forms long, smooth slopes that descend several hundred feet to the main body of the glacier. These slopes are particularly inviting to tourists for the delightful "glissades" which they afford. Sitting down on the hard snow at the head of such a slope, one may indulge in an exhilarating glide of amazing swiftness, landing at last safely on the level snows beneath.

In the early part of summer the Paradise Glacier has the appearance of a vast, unbroken snow field, blazing, immaculate, in the sun. But later, as

the fresh snows melt away from its surface, grayish patches of old crystalline ice develop in places, more especially toward the glacier's lower margin. Day by day these patches expand until, by the end of August, most of the lower



Photo by Matthes.

HEAD OF COWLITZ GLACIER.

GIBRALTAR ROCK IS SEEN ENDWISE, AT THE APEX OF THE TWO ROCK "CLEAVERS."

ice field has been stripped of its brilliant mantle. Its countenance, once bright and serene, now assumes a grim expression and becomes crisscrossed by a thousand seams, like the visage of an aged man.

Over this roughened surface trickle

countless tiny rills which, uniting, form swift rivulets and torrents, indeed veritable river systems on a miniature scale that testify with eloquence to the rapidity with which the sun consumes the snow.

COWLITZ GLACIER.

Immediately adjoining the the Paradise Glacier on the northeast, and not separated from it by any definite barrier, lies the Cowlitz Glacier, one of the stateliest ice streams of Mount Rainier. It flows in a southeasterly direction, and burrows its nose deeply into the forest-covered hills at the mountain's foot. Its upper course consists of two parallel-flowing ice streams, intrenched in profound troughs, which they have enlarged laterally until now only a narrow, ragged crest of rock remains between them, resembling a partition a thousand feet in height. At the upper end of this crest stands Gibraltar Rock.

At the point of confluence of the two branches there begins a long medial moraine that stretches like a black tape the whole length of the lower course. To judge by its position midway on the glacier's back, the two tributaries must be very nearly equal in strength, yet, when traced to their sources they are found to originate in widely different ways. The north branch, named Ingraham Glacier (after Maj. E. S. Ingraham, one of Rainier's foremost pioneers), comes from the névés on the summit; while the south branch heads in a pocket immediately under Gibraltar. No snow comes to it from the summit; hence we can not escape the conclusion that it receives through direct precipitation and through wind drifting about as much snow as its sister branch re-

ceives from the summit regions. Like the glacier troughs below, the pocket appears to have widened laterally under the influence of the ice, and is now separated from the Nisqually ice fields to the west by only a narrow rock

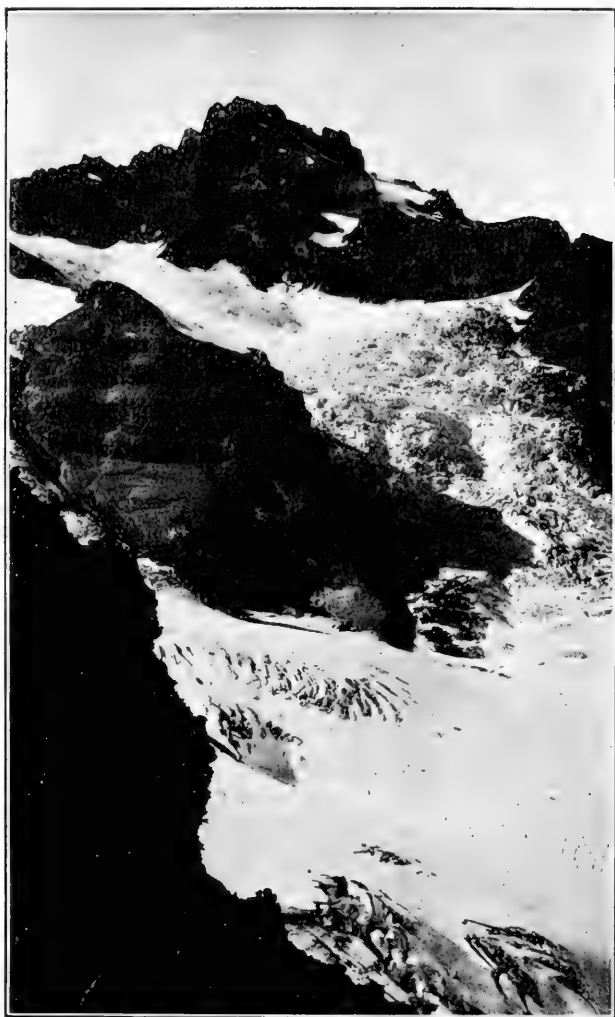


Photo by Matthes.

CASCADES OF INGRAHAM GLACIER.

IN THE BACKGROUND LITTLE TAHOMA (11,117 FEET), A REMNANT OF THE OUTER LAYERS OF THE VOLCANO, NOW MOSTLY STRIPPED AWAY BY THE ICE.

partition, the Cowlitz Cleaver, as it is locally called. Up this narrow crest the route to Gibraltar Rock ascends. The name "cleaver," it may be said in passing, is most apt for the designation of a narrow rock crest of this sort, and well deserves to be more generally used

in the place of awkward foreign terms, such as *arrete* and *grat*.

Both branches of the Cowlitz Glacier cascade steeply immediately above their confluence, but the lower glacier has a gentle gradient and a fairly uneventful course. Like the lower Nisqually, it is bordered by long morainal ridges, and toward its end acquires broad marginal dirt bands. For nearly a mile these continue, leaving a gradually narrowing lane of clear ice between them. Then they coalesce and the whole ice body becomes strewn with rock *débris*.

The Cowlitz Glacier, including its north branch, the Ingraham Glacier, measures slightly over 6 miles in length. Throughout that distance the ice stream lies sunk in a steep-walled canyon of its own carving. Imposing cliffs of columnar basalt, ribbed as if draped in corduroy, overlook its lower course. Slender waterfalls glide down their precipitous fronts, like silver threads, guided by the basalt flutings.

OHANAPECOSH AND FRYINGPAN GLACIERS

High above the Ingraham Glacier towers that sharp, residual mass of lava strata known as Little Tahoma (11,117 feet), the highest outstanding eminence on the flank of Mount Rainier. It forms a gigantic "wedge" that divides the Ingraham from the Emmons Glacier to the north. So extensive is this wedge that it carries on its back several large ice fields and interglaciers, some of which, lying far from the beaten path of the tourist, are as yet unnamed. Separating them from each other are various attenuated, pinnacled crests, all of them subordinate to a main backbone that runs eastward some 6 miles and terminates in the Cowlitz Chimneys (7,607 feet), a group of tall, rock towers that dominate the landscape on the east side of Mount Rainier.

Most of the ice fields, naturally, lie on the shady north slope of the main backbone; in fact, a series of them extends as far east as the Cowlitz Chimneys. One of the lesser crests, however, that running southeastward to the upland region known as Cowlitz Park, also gives protection to an ice

body of some magnitude, the Ohanapecosh Glacier. Considerably broader than it is long in the direction of its flow, this glacier lies on a high shelf a mile and a half across, whence it cascades down into the head of a walled-in canyon. Formerly, no doubt, it more than filled this canyon, but now it sends down only a shrunken lobe. The stream that issues from it, the Ohanapecosh River, is really the main prong and head of the Cowlitz River.

The largest and most elevated of the ice fields east of Little Tahoma is known for its peculiar shape as Fryingpan Glacier. It covers fully 3 square miles of ground and constitutes the most extensive and most beautiful interglacier on Mount Rainier. It originates in the hollow east side of Little Tahoma itself and descends rapidly northward, overlooking the great Emmons Glacier and finally reaching down almost to its level. It is not a long time since the two ice bodies were confluent.

Below the Fryingpan Glacier there lies a region of charming flower-dotted meadows named Summerland, a most attractive spot for camping.

EMMONS GLACIER.¹

Cloaking almost the entire east side of Mount Rainier is the Emmons Glacier, the most extensive ice stream on the peak (named after Samuel F. Emmons, the geologist and mountaineer who was the second to conquer the peak in 1870.) About $5\frac{1}{2}$ miles long and $1\frac{3}{4}$ miles wide in its upper half, it covers almost 8 square miles of territory. It makes a continuous descent from the summit to the base, the rim of the old crater having almost completely broken down under its heavy *névé* cascades. But two small remnants of the rim still protrude through the ice and divide it into three cascades. From each of these dark rock islands trails a long medial moraine that extends in an ever-broadening band down to the foot of the glacier.

The Emmons Glacier, like the Nisqually and the Cowlitz, becomes densely littered with morainal *débris* at its lower end, maintaining, however, for a con-

¹ This glacier is also known locally as White Glacier.

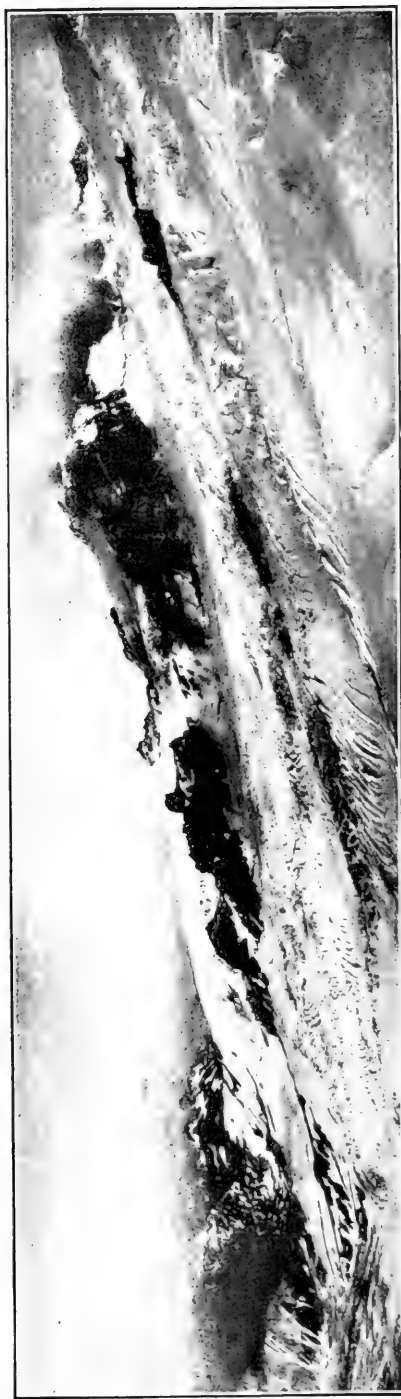


Photo by Curtis.

LOOKING SOUTH FROM THE "WEDGE" ACROSS THE ENTIRE WIDTH OF EMONS GLACIER. IN THE DISTANCE ARE LITTLE TAHOMA, SHROUDED IN MISTS, AND THE FRYING-PAN GLACIER.



Photo by Curtis.

THE CASCADES AND DOMES OF WINTHROP GLACIER. IN THE DISTANCE IS THE "WEDGE" WITH "STEAMBOAT PROW" PARTING THE DESCENDING NEVES.

siderable distance a central lane of clear ice. The stream which it sends forth, White River, is the largest of all the ice-fed streams radiating from the peak. It flows northward and then turns in a northwesterly direction, emptying finally in Puget Sound at the city of Seattle.

WINTHROP GLACIER.²

On the northeast side of the mountain, descending from the same high névés as the Emmons Glacier, is the Winthrop Glacier. Not until halfway down, at an elevation of about 10,000 feet, does it detach itself as a separate ice stream.

the domes require a word of interpretation. They are underlain by rounded bosses of especially resistant rock. Over these the ice is lifted, much as is the water of a swift mountain torrent over submerged boulders. Immediately above each obstruction the ice appears compact and free from crevasses, but as it reaches the top and begins to pour over it breaks, and a network of intersecting cracks divides it into erect, angular blocks and fantastic obelisks. Below each dome there is, as a rule, a deep hollow partly inclosed by trailing ice ridges, analogous to the whirling



Photo by Geo. V. Caesar.

A CREVASSED DOME ON THE LOWER WINTHROP GLACIER.

The division takes place at the apex of that great triangular interspace so aptly named "the Wedge." Upon its sharp cliff edge, Steamboat Prow, the descending névés part, it has been said, like swiftflowing waters upon the dividing bow of a ship at anchor. The simile is an excellent one; even the long foam crest, rising along the ship's side, is represented by a wave of ice.

Of greatest interest on the Winthrop Glacier are the ice cascades and domes. Evidently the glacier's bed is a very uneven one, giving rise to falls and pools, such as one observes in a turbulent trout stream. The cascades explain themselves readily enough, but

eddy that occurs normally below a boulder in a brook. Thus does a glacier simulate a stream of water even in its minor details.

The domes of the Winthrop Glacier measure 50 to 60 feet in height. A sample of the kind of obstruction that produces them appears, as if specially provided to satisfy human curiosity, near the terminus of the glacier. There one may see, close to the west wall of the troughlike bed, a projecting rock mass, rounded and smoothly polished over which the glacier rode but a short time ago.

Another feature of interest sometimes met with on the Winthrop Glacier,

² On some earlier Government maps this glacier is called White Glacier.

and for that matter also on the other ice streams of Mount Rainier, are the "glacier tables." These consist of slabs of rock mounted each on a pedestal of snow and producing the effect of huge toadstools. The slabs are always of large size, while the pedestals vary from a few inches to several feet in height.

CARBON GLACIER.

In many ways the most interesting of all the ice streams on Mount Rainier is the Carbon Glacier, the great ice river on the north side, which flows between those two charming natural gardens,

the great hollow, however, and so simple are its outlines that the eye finds difficulty in correctly estimating the dimensions. Not until an avalanche breaks from the 300-foot névé cliff above and hurls itself over the precipice with crashing thunder, does one begin to realize the depth of the colossal recess. The falling snow mass is several seconds in descending, and though weighing hundreds of tons, seemingly floats down with the leisureliness of a feather.

These avalanches were once believed to be the authors of the cirque. They



Photo by Geo. V. Caesar.

THE GREAT AMPHITHEATER OF CARBON GLACIER

THE HEADWALL MEASURES 3,600 FEET IN HEIGHT. GREAT AVALANCHES FALL PERIODICALLY FROM THE SNOW CLIFFS ABOVE, WHICH THEMSELVES ARE 200 TO 300 FEET HIGH.

Moraine Park and Spray Park. The third glacier in point of length, it heads, curiously, not on the summit, but in a profound, walled-in amphitheater, inset low into the mountain's flank. This amphitheater is what is technically known as a glacial cirque, a horseshoe-shaped basin elaborated by the ice from a deep gash that existed originally in the volcano's side. It has the distinction of being the largest of all the ice-sculptured cirques on Mount Rainier, and one of the grandest in the world. It measures more than a mile and a half in diameter, while its head wall towers a sheer 3,600 feet. So well proportioned is

were thought to have worn back the head wall little by little, even as a waterfall causes the cliff under it to recede. But the real manner in which glacial cirques evolve is better understood today. It is now known that cirques are produced primarily by the eroding action of the ice masses embedded in them. Slowly creeping forward, these ice masses, shod as they are with débris derived from the encircling cliffs, scour and scoop out their hollow sites, and enlarge and deepen them by degrees. Seconding this work is the rock-splitting action of water freezing in the interstices of the rock walls. This



Photo by Geo. V. Ceasar.

LOWER COURSE OF CARBON GLACIER.

THIS SHOWS THE MEDIAL MORAINES. IN THE BACKGROUND ARE THE MOTHER MOUNTAINS.

process is particularly effective in the great cleft at the glacier's head, between ice and cliff. This abyss is periodically filled with fresh snows, which freeze to the rock; then, as the glacier moves away, it tears or plucks out the frost-split fragments from the wall. Thus the latter is continually being undercut. The overhanging portions fall down, as decomposition lessens their cohesion, and so the entire cliff recedes.

West of the profound canyon of the Carbon River, there rises a craggy range which the Indians have named the Mother Mountains. From its narrow backbone one looks down on either side into broadly open, semicircular valley heads. Some drain northward to the Carbon River, some southward to the Mowich River. Encircling them run attenuated rock partitions, surmounted by low, angular peaks; while cutting across their stairwise descending floors are precipitous steps of rock, a hundred feet in height. On the treads lie scattered shallow lakelets, strung to-

gether by little silvery brooks **trickling** in capricious courses.

Most impressive is the basin **that** lies immediately under the west end of the range. Smoothly rounded like a bowl, it holds in its center an almost circular lake of vivid emerald hue—that mysterious body of water known as Crater Lake. Let it be said at once that this appellation is an unfortunate misnomer. The basin is not of volcanic origin. It lies in lava and other volcanic rocks, to be sure, but these are merely spreading layers of the cone of Mount Rainier. Ice is the agent responsible for the carving of the hollow. It was once the cradle of a glacier, and that ice mass, gnawing headward and deploying even as the Carbon Glacier does today, enlarged its site into a horseshoe basin, a typical glacial cirque. The lake in the center is a strictly normal feature; many glacial cirques possess such bowls, scooped out by the eroding ice masses from the weaker portions of the rock floor; only it is seldom that such features acquire the symmetry of form exhibited by

Crater Lake. The lakelets observed in the neighboring valley heads—all of which are abandoned cirques—are of similar origin.

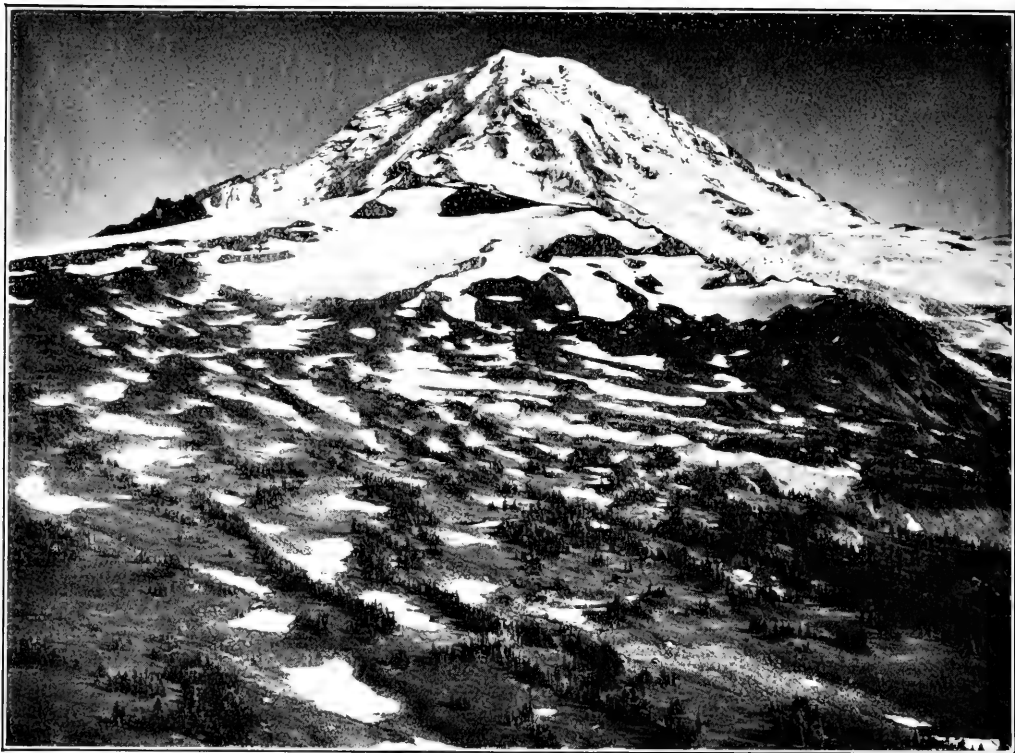
It is a significant fact that the empty cirques about the Mother Mountains lie at elevations ranging between 4,500 and 6,00 feet; that is, on an average 5,000 feet lower than the cirques on Mount Rainier which now produce glaciers. Evidently the snow line in glacial times lay at a much lower level than it does today, and the ice mantle of Mount Rainier expanded not merely by the forward lengthening of its ice tongues but by the birth of numerous new glaciers about the mountain's foot. The large size of the empty cirques and canyons, moreover, leads one to infer that many of these new glaciers far exceeded in volume the ice streams descending the volcano's sides. The latter, it is true, increased considerably in thickness during glacial times, but not in proportion to the growth of the low-level glaciers. Nor is this surprising in view of the heavy snowfalls occurring on the mountain's lower slopes. There is good reason to believe, moreover, that the cool glacial climate resulted in a general lowering of the zone of heaviest snowfall. It probably was depressed to levels between 4,000 and 6,000 feet. Not only the cirque glaciers about the Mother Mountains, but all the neighboring ice streams of the glacial epoch originated within this zone, as is indicated by the altitudes of the cirques throughout the adjoining portions of the Cascade Range. By their confluence these ice bodies produced a great system of glaciers that filled all the valleys of this mountain belt and even protruded beyond its western front.

To these extensive valley glaciers the ice flows of Mount Rainier stood in the relation of mere tributaries. They descended from regions of rather scant snowfall, for the peak in those days of frigid climate rose some 10,000 feet above the zone of heaviest snowfall, into atmospheric strata of relative dryness. It may well be, indeed, that it carried then but little more snow upon its summit than it does today.



THE NORTH MOWICH GLACIER AND THE ICEFIELDS TO THE SOUTH OF IT.

Copyrighted Photo by Curtis.



Copyrighted photo by Curtis.

MOUNT RAINIER AND SPRAY PARK.

THIS IS THE NORTHWEST SIDE AS VIEWED FROM THE MOTHER MOUNTAINS. THE SHARP WHITE SUMMIT IS LIBERTY CAP (14,112 FEET).

NORTH MOWICH GLACIER.³

The North Mowich Glacier is the northernmost of the series of ice bodies on the west flank of Mount Rainier. Like the Carbon Glacier, it heads in a cirque at the base of the Liberty Cap massif, fed by direct snow precipitation, by wind drifting, and by avalanches. The cirque is small and shallow, not as capacious even as either of the twin recesses in the Carbon Glacier's amphitheater. As a consequence the ice stream issuing from it is of only moderate volume; nevertheless it attains a length of $3\frac{3}{4}$ miles. This is due in part to the heavy snows that reinforce it throughout its middle course and in part to overflows from the ice fields bordering it on the south. These ice fields, almost extensive enough to be considered a distinct glacier, are separated from the

North Mowich Glacier only by a row of pinnacles, the remnants evidently of a narrow rock partition of "cleaver," now demolished by the ice. The lowest and most prominent of the rock spires bears the appropriate name of "The Needle" (7,587 feet).

The débris-covered lower end of the glacier splits into two short lobes on a rounded boss in the middle of the channel. This boss, but a short time ago, was overridden by the glacier and then undoubtedly gave rise to an ice dome of the kind so numerous farther up on the North Mowich Glacier and also characteristic of the Winthrop Glacier.

SOUTH MOWICH GLACIER.⁴

Separated from the ice fields of the North Mowich Glacier by a great triangular ice field (named Edmunds

³ On some earlier Government maps this glacier is called Willis Glacier.

⁴ On some earlier Government maps this glacier is called Edmunds Glacier.



WEST SIDE OF MOUNT RAINIER.

A telephoto view taken from Electron, at a distance of 20 miles. The main summit, composed of two new cinder cones (14,408 feet) is seen in the center. To the left is Liberty Cap (14,112 feet), and to the right is Peak Success (14,150 feet), both remnants of the old crater rim. The glaciers in view are 1, North Mowich; 2, Edmunds; 3, South Mowich; 4, Puyallup; 5, Tahoma

Glacier) lies the South Mowich Glacier, also a cirque-born ice stream, heading against the base of the Liberty Cap massif. It is the shortest of the western glaciers, measuring only a scant 3 miles. Aside from the snows accumulating in its ill-shaped cirque it receives strong reinforcements from its neighbor to the south—the Puyallup Glacier.

PUYALLUP GLACIER.

What especially distinguishes the Puyallup Glacier from its neighbors to the north is the great elevation of its cirque. The Carbon, North Mowich, and South Mowich Glaciers all head at levels of about 10,000 feet. The amphitheatre of the Puyallup Glacier, on the contrary, opens a full 2,000 feet higher up. Encircled by a great vertical wall that cuts into the Liberty Cap platform from the south, it has evidently developed through glacial sapping from a hollow of volcanic origin. From this

great reservoir the Puyallup Glacier descends by a rather narrow chute. Then it expands again to a width of three-fourths of a mile and sends a portion of its volume to the South Mowich Glacier. In spite of this loss it continues to expand, reaching a maximum width of a mile and a total length of 4 miles. No doubt this is accounted for by the heavy snowfalls that replenish it throughout its course.

TAHOMA GLACIER.

Immediately south of the elevated amphitheater of the Puyallup Glacier the crater rim of the volcano is breached for a distance of half a mile. Through this gap tumbles a voluminous cascade from the névé fields about the summit, and this cascade, reenforced by a flow from the Puyallup cirque, forms the great Tahoma Glacier, the most impressive ice stream on the southwest side. Separated from its northern



PEARL FALLS.

HERE THE WATER PLUNGES 300 FEET OVER A VERTICAL CLIFF OF COLUMNAR BASALT UNDER PYRAMID GLACIER. THE COLUMNS ARE SOLID AND UNBROKEN FOR 200 FEET.



Photo by Curtis.

THE LOWER END.

The Kautz Glacier in its box canyon, seen from the heights of Van Trump Park. Note the strong medial moraine that gradually develops into a ridge 100 feet high above the ice; also the rivulets on the surface of the glacier.

neighbor by a rock cleaver of remarkable length and straightness, it flows in a direct course for a distance of 5 miles. Its surface, more than a mile broad in places, is diversified by countless ice falls and cataracts.

SOUTH TAHOMA GLACIER.

The partner of the Tahoma Glacier, known as the South Tahoma Glacier, heads in a profound cirque sculptured in the flanks of the great buttress that culminates in Peak Success (14,150

feet). It is interesting chiefly as an example of a cirque-born glacier, nourished almost exclusively by direct snowfalls from the clouds and by eddying winds. In spite of its position, exposed to the midday sun, it attains a length of nearly 4 miles, a fact which impressively attests the ampleness of its ice supply.

KAUTZ GLACIER.

East of the South Tahoma Glacier, heading against a great cleaver that descends from Peak Success, lies a

triangular ice field, or interglacier, named Pyramid Glacier. It covers a fairly smooth, gently sloping platform underlain by a heavy lava bed, and breaking off at its lower edge in precipitous, columnar cliffs. Into this platform a profound but narrow box canyon has been incised by an ice stream descending from the summit névés east of Peak Success. This is the Kautz Glacier, an ice stream peculiar for its exceeding slenderness. On the map it presents almost a worm-like appearance, heightened perhaps by its strongly sinuous course. In spite of its meager width,

locality that the ice has been unable to hew out a wider passage. Not its entire volume, however, was squeezed through the narrow portal; there is abundant evidence showing that in glacial times when the ice stream was more voluminous it overrode the rock buttresses on the west side of the gorge.

VAN TRUMP GLACIER.

The name of P. B. Van Trump, the hardy pioneer climber of Mount Rainier, has been attached to the interglacier situated between the Kautz and the Nisqually Glaciers. This ice body lies



Photo by Geo. V. Caesar.

ICE CAVE AT LOWER END OF CARBON GLACIER FROM WHICH CARBON RIVER ISSUES.

which averages about 1,000 feet, the ice stream attains a length of almost 4 miles and descends to an altitude of 4,800 feet. This no doubt is to be attributed in large measure to the protecting influence of the box canyon.

A singularly fascinating spectacle is that which the moraine-covered lower end of the glacier presents from the height of Van Trump Park. A full 1,000 feet down one looks upon the ice stream as it curves around a sharp bend in its canyon.

A short distance below the glacier's terminus, the canyon contracts abruptly to a gorge only 300 feet in width. So resistant is the columnar basalt in this

on the uneven surface of an extensive wedge that tapers upward to a sharp point—one of the remnants of the old crater rim. A number of small ice fields are distributed on this wedge, each ensconced in a hollow inclosed more or less completely by low ridges. By gradually deploying each of these ice bodies has enlarged its site, and thus the dividing ridges have been converted into slender rock walls or cleavers. In many places they have even been completely consumed and the ice fields coalesce. The Van Trump Glacier is the most extensive of these composite ice fields. The rapid melting which it has suffered in the last decades, however, has

gone far toward dismembering it; already several small ice strips are threatening to become separated from the main body.

In glacial times the Van Trump Glacier sent forth at least six lobes, most of which converged farther down in the narrow valleys traversing the attractive alpine region now known as Van Trump Park. This upland park owes its scenic charm largely to its manifold glacial features and is diversified by cirques, canyons, lakelets, moraines, and waterfalls.

In the foregoing descriptions the endeavor has been to make clear how widely the glaciers of Mount Rainier differ in character, in situation, and in size. They are not to be conceived as mere ice tongues radiating down the slopes of the volcano from an ice cap on

its crown. There is no ice cap, properly speaking and there has perhaps never been one at any time in the mountain's history, not even during the glacial epochs.

Several of the main ice streams head in the névés gathering about the summit craters, but a larger number originate in profound amphitheaters carved in the mountain's flanks, at levels fully 4,000 feet below the summit. In the general distribution of the glaciers the low temperatures prevailing at high altitudes have, of course, been a controlling factor; nevertheless in many instances their influence has been outbalanced by topographic features favoring local snow accumulation and by the heavy snowfalls occurring on the lower slopes.

From a bulletin by F. E. Matthes.

FIRE DANGER SERIOUS

THE fire situation in the Northwest is the most serious since 1910, which went down in history as the worst year since organized patrol had been in effect. So far, however, no serious damage to standing timber has resulted. This can be attributed entirely to the organized protection forces, which are giving conclusive proof of their ability to cope with a bad situation.

No rain has fallen for nearly two months and the woods are extremely dry.

The worst fire of record on private lands so far this year is in Lotah County, Idaho. The Potlatch Timber Protective Association during the first part of August had a crew of from 250 to 800 men fighting the fire and practically prevented the loss of any green timber. There was, however, of necessity some loss of logging equipment.

Up to early August most fires have been in old slashings, and in the lower and more thickly settled country. With the opening of the hunting season, however, fires started in the higher areas.

While no predictions can be made, it is felt by protection agencies generally, that in the absence of unusually high winds or excessive temperatures during August, losses can be kept down to a low figure. Although a large number of fires have occurred in Oregon this season, there has been no material loss of green timber, and slight loss of logging equipment, according to reports received by the Oregon Forest Fire Association. Fire fighting expenses will, however, be heavy in some sections.

A considerable crew of men have been constantly engaged in this work since early in July. Only in two or three instances have fires gotten such a start as to allow of their going into the tops. Great apprehension is felt because of the fact that many deer hunters are in the mountains. The country is extremely smoky, rendering many lookout points valueless. The private owners of timber have some 300 wardens in the field and the state ninety. This number is in addition to the force of the Forest Service.

An appropriation of \$25,000.00 was

made available by the passage of the Federal Sundry Civil Bill with which to furnish protection for some two million acres within the Oregon & California Railroad Company's grant, title to which is in question. The Government brought action to cancel title to this grant over a year ago and decision is now pending before the United States Supreme Court. About ninety patrolmen went on duty in Western Oregon to protect the grant early in August. The Forest Service which has been given charge of conducting the work of protection is acting in close coöperation with existing protection agencies.

Washington had seventy fires during July, nearly all of them being slashing fires. A few logs were burned as well as some camp equipment, and the improvement of one settler. Accurate figures on losses are not available, but the amount is small, taking into account the number of fires occurring. Donkey engines, locomotives, berry pickers, and lightning are given as the causes of the fires. About 100 men are on patrol duty for the Washington Forest Fire Association, while the State Fire Warden has on some seventy men.

Idaho in common with other states has experienced high temperatures and practically no rain during July. A number of fires have started, but prompt discovery has practically prevented loss. A small amount of green timber has been fire-killed. Campers, lightning and brush-burning are responsible for nearly all fires which have occur-

red in the state. The full patrol force is on duty.

Montana has experienced no severe fires. The State and Forest Service are coöperating in an effort to properly cover the timbered sections adjacent to the National Forests.

Oregon reports about 100 fires for the month, the most severe ones being in old slashings. An inconsiderable amount of green timber has been fire-killed. The State Forester has ninety men on patrol paid by State and Weeks law funds and private owners are employing 300 wardens. Telephone service which has been greatly improved the past year is proving a marked factor in protection work. High winds, hot weather and practically no precipitation have put the woods in dangerous condition.

Reports from portions of California indicate more favorable conditions than last season, while the contrary is true elsewhere in the northwest.

Throughout the northwest the preparations made early in the season to meet a bad year are proving extremely helpful. Never before has such close working coöperation existed between the Government, States, and private patrols, and to this can be largely attributed the success of the work up to the present time. From now on hunters and campers will be going into the mountains, and their coöperation is needed to prevent fires. Loggers, road builders and ranchers should be doubly careful with fire. Only through such care will serious fires be averted.



LOGGING A RIVER BOTTOM

By EDWARD F. BIGELOW.

FOR some two decades, beginning a half century ago and ending thirty years ago, Big Rapids, Michigan, was one of the famous lumber centers of the United States. Here was the finest, tallest, biggest trees. Here existed the typical methods of lumber cutting of that period. Lumber was so plentiful that it was gathered recklessly. The methods of taking a claim were such as to attract large numbers of lumbermen, and for a hundred miles up the river, the sound of saws and axes was heard on every side, and far back into the country. Logs in a profusion seemingly endless filled the river. They filled it not only on the surface, but they filled the entire river to the bottom of the deepest places in the channel. They were piled in the river in such numbers that logs on top pushed other logs to the bottom, and still others came on top of these, till the river for many miles was, in places, a solid mass of logs.

A year ago last summer, the dam at Big Rapids, Michigan, was carried away. In some eastern places the breaking of such a dam would be followed by an abnormal supply of fish. Old settlers tell of their experience in

carrying off fish by the wagonload and the cartload; but here was revealed to the present generation the amazing fact that the entire bottom of the river was a matted mass of logs. When the dam broke, great was the astonishment at the sight of that thick floor of logs. The Muskegon Lumber Company bought from the original owners their rights, and began the removal. The work of taking the logs from the river bottom has been done until logs line the banks to a width of many rods and for long distances, a lumbering scene that must rival the busiest scenes of the lumber camps that existed more than thirty years ago. The logs were water-soaked, but in fairly good condition. The accompanying photographs show one section after the lumber company had been at work for several months. Unfortunately no local photographer seemed to appreciate the picturesqueness and the novelty of such an astonishing sight. No photographs of the scene at its best are obtainable.

Old-timers of Big Rapids become loquacious and tell of the interesting scenes of the time when the "river hogs," as the waders were called, made things lively in that town of mushroom growth. It was a mecca for all kinds



THE RIVER BANK IS LINED WITH LOGS.



THE LOGS LINE THE RAILROAD TRACKS AS WELL AS THE RIVER BANK FOR MILES

of workers in logging, but especially for those who were skilled in setting loose huge piles of logs to float down the stream. These logs would often become wedged together, when a skilful "river hog" could, with a cant hook, remove the keystone log and let the immense heap go tumbling free with thundering noise and swirling currents, only perhaps to become again blocked in another place.

These old-time residents are interested in deciphering the various marks on the ends of the logs, and in pleasant reminiscence they talk of the "good old times" when such men as "Doc" Blodgett and others were active. It is probable that in all the United States there has never been such novel lumbering scenes, nor such deeds as have been done in this last year in Big Rapids.

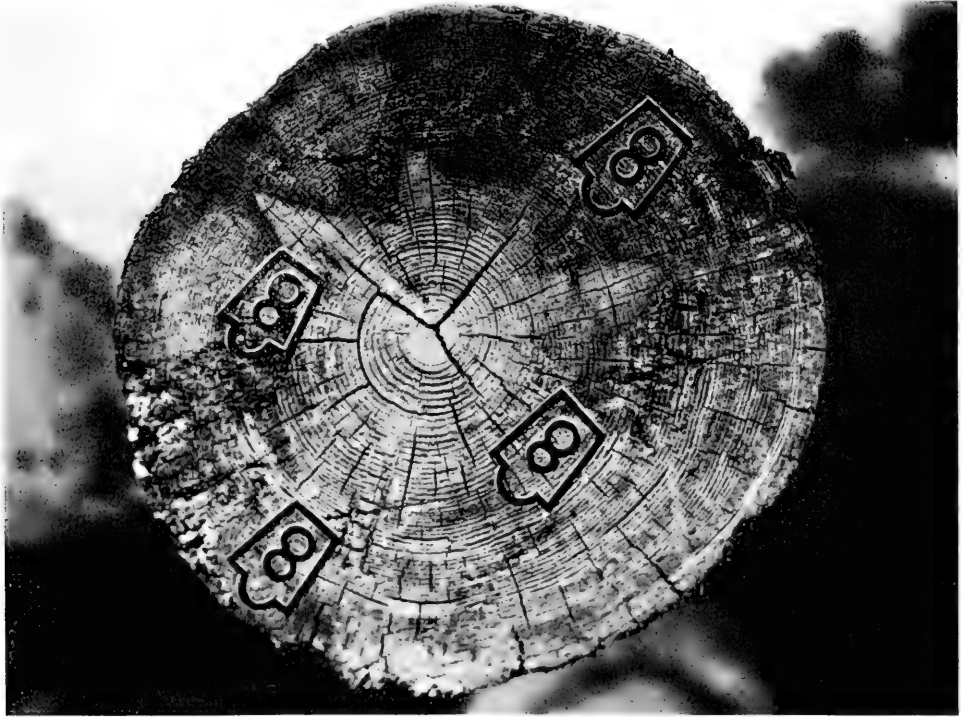
Mr. James Gow, of Muskegon, Michigan, is the prime mover in this work. He is and for a long time has been the president of the Muskegon Log Owners' Booming Company. He

has been personally able to purchase ninety-six per cent. of all the marks that were used by the old-time loggers on the Muskegon Lake and Muskegon tributaries. At the present time Mr. Gow owns nine hundred and thirty-four marks and controls others.

He and his company have been securing and will continue to secure an almost incredible amount of lumber from the bottom of the river. In the last two years alone he has secured 50,000 logs. Of this astonishing number, 24,000 were raised in the vicinity of Big Rapids. The rest have been taken at different points between Maple Island and Muskegon, where his mill is located. At these points, aside from Big Rapids, the logs are raised by a machine known as a log lifter, which is practically a scow fitted up with the proper machinery. When the dam was removed at Big Rapids the water ran off. It was then a simple matter to haul the logs out of the muddy river bed to the bank, where they are left to

dry. A section of these drying logs is shown in the accompanying photographs. An enormous number has already been removed. It is almost impossible to ascertain what can yet be done. A capable and conservative man who has investigated the matter does not hesitate to say that there are more than 600,000,000 feet of logs in this

age, but they seem to have been satisfied if they secured 75 per cent and left 25 per cent to vanish. Such recklessness is suggestive of the wholesale slaughtering of the wild pigeons. At one time flocks of pigeons were so numerous and so crowded that they consumed a whole day in passing over a given point, and darkened the land-



ALL THE RIVER LOGS BEAR THEIR OWNERS IDENTIFYING NUMBERS OR MARKS.

stream and its tributaries. No one knows what may yet be obtained from the small river Manistee. Some state that more than 40,000,000 feet have already been raised. It is said that some of the islands are founded on a mass of logs that extend to an unknown depth.

What careless accounting there must have been, to allow 600,000,000 feet of lumber to become stranded in the river with nobody even to attempt to recover it, or perhaps even to know of it. The owners of these thousands of logs must in those days have known of the short-

scape. Such great flocks were caught in nets and slaughtered by the thousand as food for hogs. The pigeons have been exterminated; and a shortage in lumber is beginning to be felt.

Old-time lumbermen tell of characters once famous among them. One particularly is cited in a cordial way as Dr. Blodgett, commonly known as the "Doc," a nickname given to him when a young man. Long ago he was laid away to rest with other prominent lumbermen, such as Ryerson, Hill and Charles H. Hackley, who accumulated upwards of \$9,000,000. Few people have done



FROM RIVER BANK TO SAWMILL.

HUNDREDS AND HUNDREDS OF CAR LOADS HAVE BEEN TAKEN FROM THE BOTTOM OF THE RIVER AND SHIPPED BY RAIL TO THE SAWMILLS.

more for a city than Mr. Hackley has done. He did philanthropic work for Muskegon on a grand scale, and left by his will more than \$2,000,000 for the establishment of libraries, hospitals, art gallery, training schools and other things of public benefit.

Mr. Hackley was the first man to erect a monument to President McKinley.

Probably the credit for the first suggestion of this novel method of raising logs from the river bed belongs to Mr. John Torrent, who is yet living at the age of eighty-two years and is still an active man. He interested Mr. James Gow, of Muskegon, Mich., in the proposition, after he had been in the lumbering business for more than thirty years in partnership with Mr. John Campbell. In the year 1912, Mr. Gow bought out Mr. Campbell's interest with this proposition in view and says that he feels well pleased with the plan.

The old lumberman, with possibly a few exceptions, came to Muskegon when they were young, and having plenty of energy and brains, lifted

themselves from poverty into financial prominence. A story of those exciting lumbering days would not be complete without mention of Jonathan Boyce. He, with others, overcame many obstacles in those pioneer times. One that Mr. Gow had to contend against was the claim that, because these logs have lain for so long a time in the river with apparently no ownership, any person had the right to salvage and keep them. One sawmill started in to cut up some of these logs without securing any right or title, but Mr. Gow got ahead of them by buying up the marks from the heirs and then fought the matter in the courts. In 1908 Mr. Gow was successful in the supreme court of Michigan, winning a suit that firmly established his claim to logs bearing marks that he owned, and he now has the entire right of way in this novel lumbering from the bed of the rivers.

The astonishing fact is that the lumber produced from these logs is of pretty nearly as good quality as when they were first cut and for some purposes equally good.



HANDLING MANUFACTURED LUMBER.

THE FIRST CABLEWAY FOR THIS PURPOSE IS INSTALLED BY THE PORT BLAKELY MILL COMPANY OF SEATTLE, WASHINGTON.

HANDLING LUMBER BY CABLEWAY

THE economy, facility and rapidity with which logs can be handled by overhead cableways has been demonstrated in many places. Such cableways, in their varieties, are in use in many parts of the world for taking logs out of the woods, loading them on cars and vessels, transporting them across gullies and streams, unloading vessels and cars or picking the logs up from the water and storing them in piles and sorting and feeding them to the mills.

The Port Blakely Mill Company is, however, the first concern in the country to install a cableway solely for the purpose of handling manufactured lumber. The great success of this cableway and the satisfaction which it has given to the purchaser make a description of this cableway and its uses interesting.

The Port Blakely Mill Company is

one of the best known concerns in the Northwest. They have been operating since 1858 and built up a business which required one of the largest mills in the country. The mill site is on an inlet opening into Puget Sound directly opposite Seattle and about seven or eight miles from that city. The mill was built on the North shore of the inlet, where an extensive dock frontage was developed. The yards for lumber are on the South side of the inlet. These yards are close to three-quarters of a mile long and are separated from the North shore, where the mill stands, by something like 400 or 500 feet of open water. As originally arranged, there was a bridge across the inlet and the manufactured lumber, which was to be held in stock, or shipped by rail, was taken across the bridge. A fire de-

stroyed the mill in 1907. Part of the dock and the bridge were also burned.

When the new mill was built the matter of transporting the manufactured lumber across the inlet to the yards and railroad was taken up with the Lidgerwood Mfg. Co. and it was determined to substitute a cableway for the bridge. The mill has a capacity of 305 M. feet per day. Part of this output is shipped by water and the vessels lie at the north, or mill-side, of the inlet to receive this. A large portion of the lumber is, however, brought across the inlet, either to be temporarily stored, or to be shipped by rail. Railroad tracks run through the yards, as can be seen in the cut.

The logs come to the mill in rafts and are taken in by means of the usual haul-up chains at the far end of the mill, as it is seen in the illustration. The finished lumber comes out at the end of the mill seen in the center of the illustration. Boards and similar material, go to sorting tables on the north side of this wing and are loaded by hand on trucks. The trucks each carry a load of 1,000 board feet. Large dimension lumber is delivered from the end of the wing and is loaded on the trucks in the same sized loads as the boards. The trucks are four feet wide and nine feet long, built of timber, and run on two wheels and an axle under the center of each truck. The trucks

are run out to where they are under the cableway, the cableway picks them up, lumber and all, carries them across the inlet and lowers them down to any of the many run-aways or tracks provided in the yards. In the illustration a truck loaded with lumber is seen suspended in the center of the picture ready to be landed wherever it may be wanted for distributing the lumber.

The cableway may be used also for loading lumber directly from the yards into scows or upon cars.

The cableway was designed for a capacity of 15,000 feet per hour, but it has many times exceeded this in actual practice, especially when handling lumber both ways. The cableway was designed and built by the Lidgerwood Mfg. Co., of New York. Its total span between towers is 1,176 feet. The towers are of wood. The head tower is 100 feet high and the tail tower is 90 feet in height. It is nominally a five-ton cableway, intended to carry loads of from four to six tons. The usual load is about 4,000 pounds of lumber and the weight of the truck, which is about 900 pounds. The loads are hoisted at a speed of 250 feet per minute, and the carriage, or conveying speed, along the cable is 1,200 feet per minute. A fair average speed of operation is twenty trips per hour, but as many as twenty-five trips may be made under favorable conditions.

A ROADSIDE TREE LAW

By CHAPIN JONES
Assistant State Forester

THE growing sentiment in Maryland in favor of the planting, care and protection of roadside trees has crystallized in the passage by the Legislature of 1914 of a roadside tree law, which has placed Maryland in the front rank of the states making provision for beautifying its roadsides. Before the passage of this law the situation in Maryland was the same as in other states

where there is no definite provision by law for their protection. While public opinion is practically unanimous in desiring their protection and deploring their mutilation, yet no one is legally authorized to defend them, and since what is everybody's business is nobody's business the roadside trees, some of them cherished, old landmarks, have been mutilated and destroyed ruthlessly, principally by telephone and electric

light companies which have wanted to save a little expense in erecting and maintaining their lines.

Planting of trees has also been done only in a very spasmodic way and on a small scale because there was no assurance that the trees would be protected and because everyone feels that the expense of such work should be borne by the public and not by private individuals. It is also recognized that in addition to the beauty of shade trees along a road or street and the great contribution to the comfort of traveling which is afforded by their shade and the lessening of the force of the winds, trees along an improved road are of decided advantage from the standpoint of maintaining in good condition the surface of the road itself, and should therefore be considered part of the improvements of the road. The heavy traffic on modern improved roads grinds the stone surface, and if the surface is dry the suction from the swiftly moving automobiles lifts this binder in clouds of dust which is then blown away; but the binder remains in place if moist, as it is when well shaded by trees on the side. In view of these conditions public opinion was very strongly in favor of the movement to put the control of roadside and street trees under the State Board of Forestry, and the passage of the roadside tree law has met with almost unanimous approval.

The law stipulates that the term roadside trees means all trees planted by the Forest Wardens, or existing trees three inches or more in diameter, measured two feet from the ground, that may be growing within the right-of-way of any public road or between the curb lines and property lines of any streets in an incorporated town in the State. The trees on the streets of the City of Baltimore come under the provisions of the law, but since the City presents a peculiar problem and since before the passage of the State law it had a City Forester and an appropriation for this particular work, the administration of the trees on the streets in the City is being left to the City Forester as before.

It is made a misdemeanor punishable by a fine for any person to cut down, trim, mutilate or in any manner injure any roadside tree without a permit from the State Board of Forestry, except in an emergency where trees have been uprooted or branches broken in such a way as to endanger persons or property; and it is made the duty of the Forest Wardens and others having police power in the State to arrest all offenders. Under this provision wanton mutilation of trees will in all cases be prosecuted by the State Board of Forestry, and where trimming is desired by pole line companies in order to free their wires from contact with trees which are growing into them, permission will be given where such work can be done without any great damage to the trees and where the value of the service by the electric light or telephone company justifies it, but always under the direct supervision of a Forest Warden of the State of Maryland, who has been instructed in the correct principles and methods by the experts of the State Board of Forestry. In many instances if the work is done right, considerable trimming can be done in a tree without any appreciable damage being done, provided it is done by people who understand it and have the welfare of the tree at heart.

The leaving of stubs is not permitted. All cuts must be properly made and all large ones covered with an antiseptic, and the use of climbing irons on trees is forbidden.

It is provided that the planting of trees along roadsides shall be done only according to plans approved by the State Forester. This provision is made in order that the trees planted may be of good stock, of the right species and suitably spaced, etc., and in order that the street or road may be developed systematically and uniformly. The average person has little knowledge of such matters and as a result planting has often been done of inferior species and shade trees have usually been placed too close together, and in the matter of caring for trees by spraying, it is very necessary that it should be under the control of the State Forester since un-

less just the right methods are pursued the results are of little value and since spraying by one person of the trees in his neighborhood would not accomplish sufficient results unless his neighbors also adopted such measures. The necessity of having such work controlled by the State is perfectly evident in the case of Massachusetts and other states where the damage by caterpillars and leaf-eating insects is much more severe than it is at present in Maryland. The initiative in applying for the planting and care of trees can be taken by the County Commissioners, the Road Supervisor of any County, the State Roads Commission, the Town Council of any incorporated town, or by any organization or person, but the plan of procedure cannot go into effect without the approval of the State Forester or his agent. The organization desiring the work done must then guarantee the cost of the original planting and also of such subsequent care as may be necessary.

It is provided that the State Forester may at his discretion without being requested as above, plant, care for and protect roadside trees with the consent of the adjoining property owner, and pay for such work out of any unexpended balance to the credit of the Board, but since the Roadside Tree Law itself carries no appropriation it would be out of the question for the State Forester to do such planting except on a very small scale as a demonstration of what can be done. An appropriation to carry on this work is urgently needed and will presumably be provided by the next Legislature.

It is made a misdemeanor punishable by fine for any person in any manner to post any advertising signs or billboards other than such notices which are posted in pursuance of law on any stone, tree, etc., which is upon a public highway or which is on the property of another without first obtaining the written consent of the owner. This is a much needed reform and as a means of beautifying the roads goes hand in hand with the planting and care of roadside trees.

ACTIVITIES UNDER THE NEW LAW.

The State Board of Forestry believed that the most good could be accomplished at once by instituting an organized campaign against the sign board nuisance and designated June 20th as Sign Board Day, the day on which an organized cleaning up of unauthorized advertising signs, billboards, etc., should be made along all the roads in the State. The State Forester mailed copies of the law and letters asking for the names of people who would be apt to assist in this work to a long list of people who would presumably be interested, such as Presidents of Banks, County Commissioners, States Attorneys, members of the State Roads Commission, School Superintendents and School Teachers. The support accorded the movement was very general, and the names of a great many responsible and interested people were sent in, and to these people the State Forester sent a Sign-Board Day badge, copies of the law and printed instructions as to how to proceed in tearing down unauthorized signs, together with a warning not to molest signs on private property which had been erected with the permission of the owner of the land.

The Boy Scouts were also enlisted in the work and did valuable service, for which a number of medals are to be distributed to them.

After this general cleaning up, any such notices that may be posted hereafter will be more conspicuous and very likely to be torn down as soon as they are put up.

In order to enforce the law against trimming of trees without a permit, without any unnecessary friction, the State Forester called at his office a conference of representatives of the various companies operating pole lines in the State. The conference was well attended, and great interest was manifested, and a disposition to co-operate with the State Forester for the benefit of all concerned. The pole line companies, since they are obliged to bear the expenses of the supervision of any trimming by the Forest Wardens, readily agreed to concentrate the work as much as possible and to send in applica-

tions for permits some time in advance of the time when they considered trimming necessary. The State Forester furnished to the companies blank applications for permits, which the companies are now filling in and sending to the State Forester.

While all the details of administration have not as yet been worked out there does not seem to be any insuperable difficulty in working the problem

out along these lines. In each county an inspector, trained and instructed in this work by the State Forester, will personally supervise the more important jobs and in turn instruct the local Forest Wardens in the counties in the principles and methods of procedure.

A considerable improvement in the appearance of the roadside trees in Maryland is confidently expected as a result of the operation of this law.

FIRE PROTECTIVE WORK

MONROE County, Pennsylvania, has been the first to try out the new supplementary acts, passed by the last legislature, which provide for the appointment of State Foresters to act as District Foresters in designated counties, and also for a system of fire patrol. District Forester John L. Strobeck has made two interesting reports upon the practical working of the new laws.

The spring fire season of 1914 was unusually favorable to outbreaks of forest fires. There were thirty-six in all; but some were detected so quickly and put out so promptly that they were not considered important enough to be included in the official reports of the wardens. Mr. Strobeck considers this an error and advises that every fire should hereafter be included in the reports sent to the Commissioner of Forestry. Four thousand eight hundred and forty-two acres were burned over, in different parts of the county. The causes of the fires, according to the reports of the wardens, were as follows:

Unknown, 6; railroads, 15; lighted tobacco, 6; incendiary, 5; brush burning, 3, and lightning, 1.

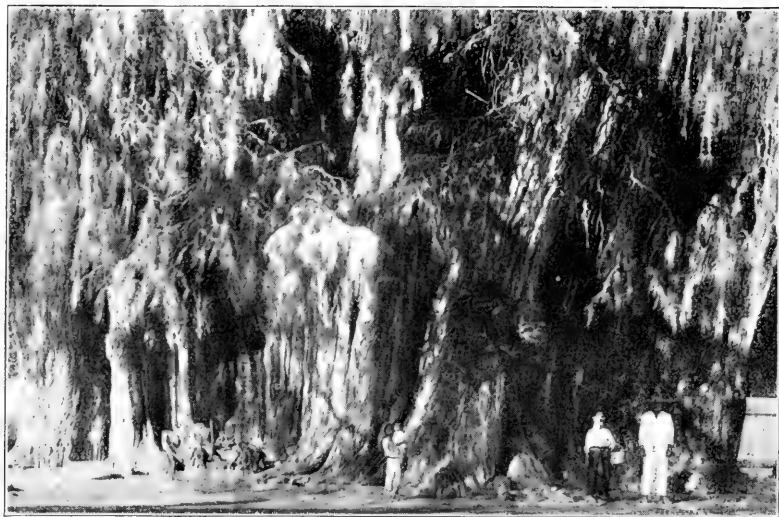
The Pocono Protective Fire Association of Monroe County, took advantage of the recent Act of Legislature, No. 432, to inaugurate a fire patrol in conjunction with the Department of Forestry. Two patrolmen were appointed to try out the new system, and the results of the trial have been so satisfactory that the District Forester is urging an increase in the number of patrolmen before the autumn fire season comes around. He also recommends the establishment of telephone connection with the lookout stations, the distribution of posters, and improvements in apparatus for extinguishing fires.

The cost to the State for fighting these fires amounted to \$282.13. To this sum must be added the cost of maintaining two patrolmen for two months, \$101.00 on the part of the State, and \$100.00 on the part of the Pocono Protective Fire Association.

WANTED—BACK NUMBERS

Members of American Forestry Association who have back numbers of AMERICAN FORESTRY, will confer a great favor upon the Association if they will sell to it any of the follow-

ing copies: November, 1908.
October, 1911.
February, 1912.
April, 1912.
May, 1912.



A GIANT TULE TREE, MITLA, MEXICO.
THE CIRCUMFERENCE IS 145 FEET TWO INCHES AND THE TREE HAS BEEN A SILENT WITNESS OF
THE PASSAGE OF SEVERAL CIVILIZATIONS

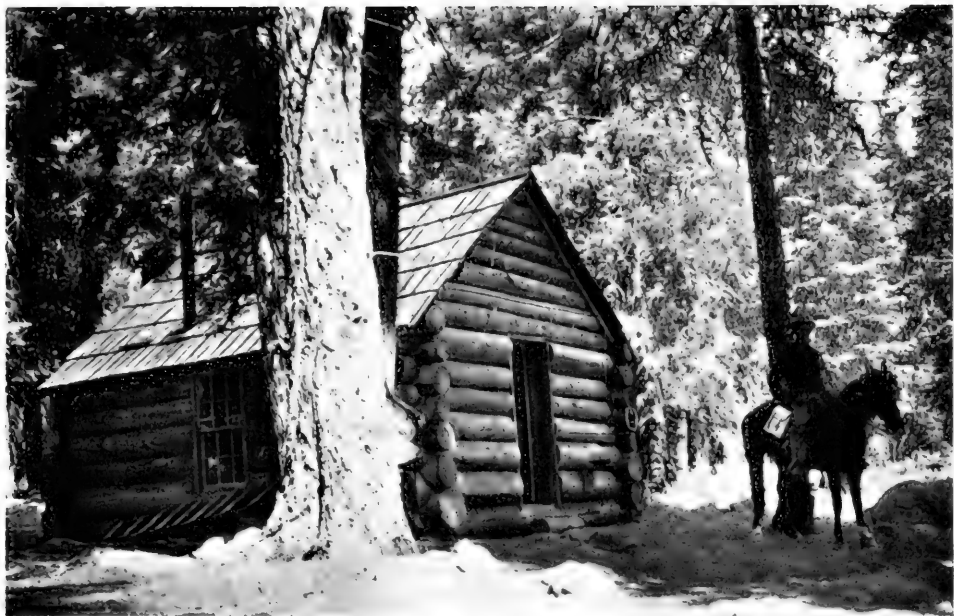
WORLD'S LARGEST TREE TRUNK

THE giant tule tree which stands in the little churchyard at Mitla, Mexico, is an object of interest to many tourists. It is said to have the largest trunk of any tree in the world. Its circumference at its largest point measures 145 feet and 2 inches. So large is this trunk that a full grown man when standing by it appears to be of insignificant size. The ancient tree is greatly revered by the native of that part of Mexico. In passing beneath its overspreading branches these simple-minded people never fail to tarry a moment and pay quiet devotion to the great monument of nature.

The age of this tree is a matter of conjecture. It is said to be no larger now than when it was first discovered

by the Spanish hosts which followed Hernando Cortez to the shore of Mexico nearly four centuries ago, says the *American Lumberman*. According to the theory of some scientists the tree has been silent witness to several different civilizations. Within its shadow, almost, are the prehistoric ruins of Mitla, which are of never-failing interest to all archaeologists. To the romantic mind may be pictured the scene of this giant tree looking down upon the prehistoric people as they built the great structures which now stand in ruins at its very feet. The tree bids fair to stand through coming centuries and, perhaps, witness other changes in the human progress of events of as great moment as those which it has already passed through.





HEADQUARTERS OF THE CO-OPERATIVE PATROLMAN.

FIRE PROTECTION IN CALIFORNIA

By KNOWLTON MILLS, *Forest Examiner, Tahoe National Forest.*

IN WORKING towards the ideal of efficient fire protection it is essential to take advantage of every possible chance for cooperation between interested bodies. The possibilities of cooperation have undoubtedly been most fully realized in the Pacific Northwest where the work of private, federal and State agencies is now so well coordinated that the efficiency of all three is thereby greatly increased. Cooperation in protection, however, will necessarily take various forms in meeting various conditions. For the last five years a cooperative agreement has been in force between a pulp and paper company in California and the Forest Service, which has resulted in keeping fire damage on the company's lands down to a minimum and has given complete satisfaction both to the company and to the Service.

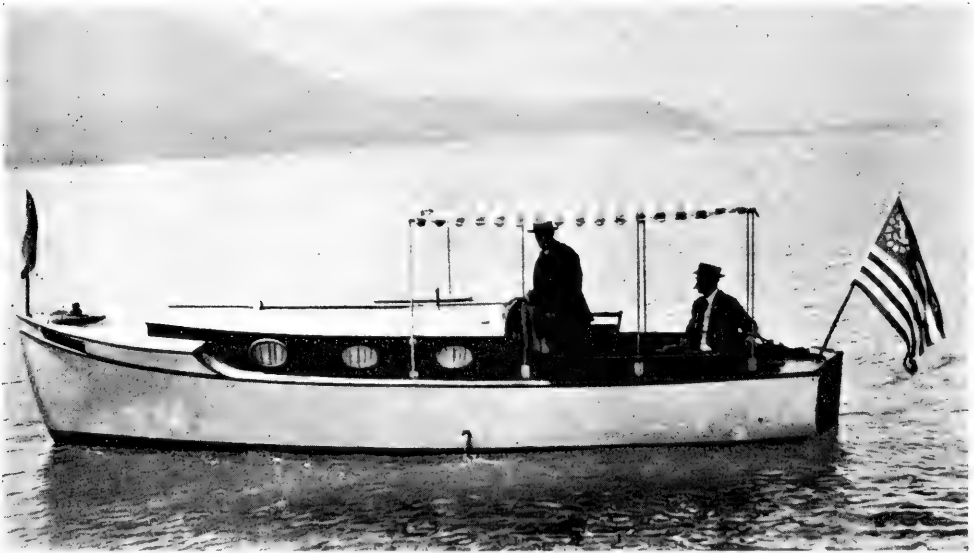
The Crown Columbia Paper Company of San Francisco controls approximately 40,000 acres of timberland in

eastern California and western Nevada, in the region north and northeast of Lake Tahoe and south of the Southern Pacific Railroad. The land is at an elevation of 6,000 to 9,000 feet on the eastern slope of the Sierras and is rough in topography. About 20,000 cords of red fir and white fir pulpwood are cut annually on this tract, for use at the company's pulp and paper mill at Floriston, California.

Although the fire danger in the fir type is not generally excessive, some special factors here contribute to increase the risk. As the tract is located within the lightning belt a number of fires have started from this cause. During the summer a large number of tourists visiting Lake Tahoe frequent the area, causing considerable danger from camp fires. As an additional source of danger wood-cutting for the Lake Tahoe resorts has left a large slash area in the southern part of the tract. With this serious fire risk exist-

ing for six months of the year and with its heavy investment in machinery at the Floriston plant it became evident to the company in the winter of 1908 that it would be a wise policy to insure, as far as possible, the permanence of its supply of raw material by means of a system of organized protection. As the company cuts fir only for pulpwood, leaving the remaining timber, which consists largely of pine, valuable for saw timber, they became convinced that fire protection would eventually pay for itself by protecting the cut-over land

This agreement provides that the district forester and the company establish a system of fire protection on the company's lands, that the supervisor of the Tahoe National Forest shall have full control of all work of patrolmen and fire fighters on the land, that the company pays for protection and patrol during the fire season a maximum of \$250 a month, including the services of not less than three men. The company also agrees to pay towards the cost of fire fighting on its land such amounts as shall be agreed upon with the Super-

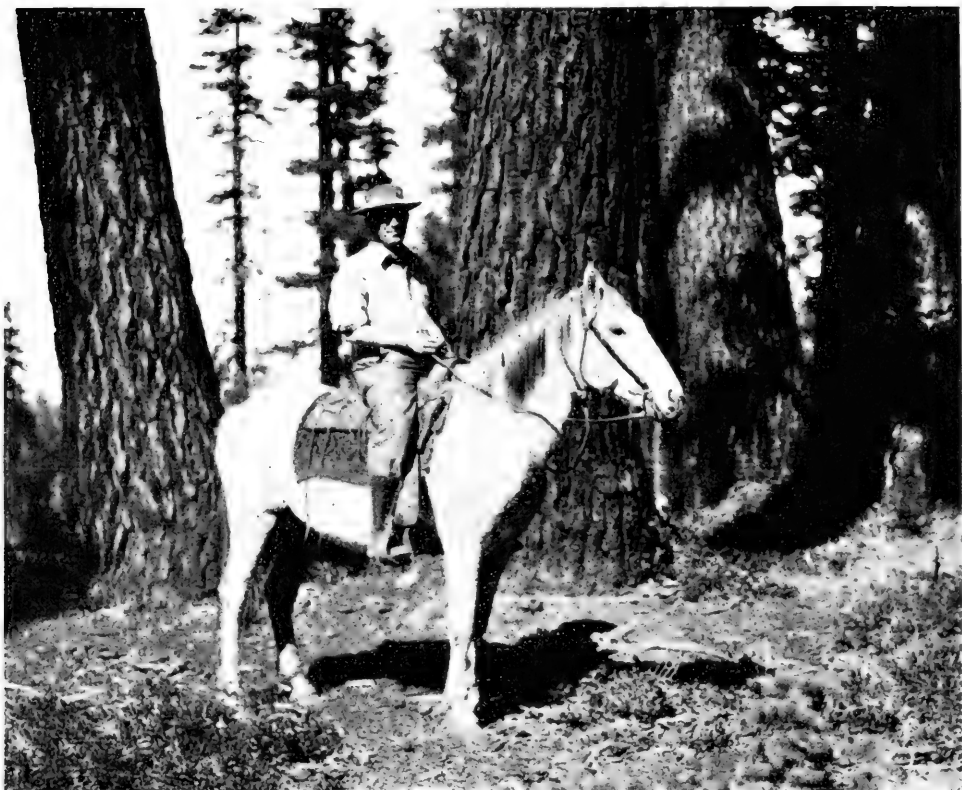


FOREST SERVICE FIRE PATROL LAUNCH "RANGER" ON LAKE TAHOE.

as well as the virgin timber. Since the company's lands are either within or closely adjoining the Tahoe National Forest, they were afforded a considerable amount of protection from the Forest Service patrol and lookout system. Feeling the need of more intensive protection, the Secretary of the company, Mr. Frank Schwabacher, whose energy and enthusiasm have been largely responsible for the success of the plan, took up with the District Forester, at the beginning of the fire season in 1909, the proposition of a cooperative agreement. An informal arrangement was then made which was followed continuously until 1913, when a new agreement was made.

visor, and to pay these bills promptly, while the District Forester agrees at the end of the fire season to report to the company on the work done under the agreement, with a detailed statement of expenditures and also show the location, area, total cost and damage of each fire. The contract remains in force year after year until terminated by either party.

An apparent objection to the agreement is that it does not seem to be sufficiently detailed and definite, leaving too much room for misunderstanding. The successful results of the plan, however, have proved that this objection does not hold. Since it was difficult to foresee, for any length of time ahead,



MR. FRANK SCHWABACHER ON INSPECTION TRIP.
SHOWING CALIFORNIA RED FIR PULPWOOD LUMBER IN BACKGROUND.

the exact form which the cooperative work should take and to forecast the methods which would give the greatest protection for the least cost, it seemed best to put the spirit and main essentials of the cooperation into the adopted form, leaving the details to be settled as they come up, by mutual understanding between the company and the Service. This has worked out most satisfactorily, for not the slightest hitch nor misunderstanding has occurred since the beginning of the cooperation, and the work throughout has been followed with keen interest on both sides.

After the informal agreement had been in force for one season the value of having a fire plan for the organization of the cooperative protection work became evident. In 1910 Forest Assistant J. A. Mitchell was detailed for this and constructed a plan which, with some later revisions, has been closely

followed. Its cost was borne by the Company but since its value extends over a long period the cost has not been noticeable from year to year. Each winter the protection work accomplished during the past season is reviewed by Supervisor Bigelow of the Tahoe National Forest and Mr. Schwabacher of the Company, and details of the work for the coming season are discussed and determined. Two patrolmen and a lookout working in coordination with the regular Forest Service organization for the district form an adequate force for present needs. The Service maintains a launch patrol on Lake Tahoe and has a ranger and a fire guard throughout the fire season on that part of the Tahoe Forest which is adjacent to the Company's holdings. A lookout is established on a centrally located peak at an elevation of 8,600 feet, overlooking at least 90 per cent of



TELEPHONE STATION ON PATROL ROUTE.

A NUMBER OF THESE TELEPHONE STATIONS ARE DISTRIBUTED OVER THE DISTRICT SO THAT ALARMS OF FIRE MAY BE SENT QUICKLY TO HEADQUARTERS.

the cooperative tract and covering a range of vision of about 300,000 acres, one-third of which is National Forest land and the remainder alienated land closely adjacent to the Forest boundaries. The cost of the lookout man's salary is divided between the Company and the Service. Constant telephone communication is maintained between the cooperative guards, lookout, launch patrolman and forest rangers. In case of fire the patrolmen get in touch with central stations which send out necessary men and supplies. Several owners and operators in the locality are also prepared to give assistance in emergencies.

The patrolmen are placed in the field before the fire season commences and retained after the danger is over for a short period each year for the purpose of maintaining existing improvements and doing new construction. Since the agreement has been in force five patrolmen's cabins and three pastures have

been built and approximately 50 miles of telephone line and 36 miles of trail have been constructed by the company and Forest Service in cooperation. In the tract north of Lake Tahoe trails and telephones are so arranged that it is not necessary for a patrolman to ride more than two miles from any point to reach a telephone. Trails have been carefully blazed so that men unfamiliar with the country may find their way to any point without guides, in cases of emergency. A fire line about a mile long has been made, protecting a valuable stand of timber from a dangerous slash area. Tools necessary for construction work and fire fighting are stored in adequate amounts at suitable points. An inventory is taken by the district ranger at the end of the season and any losses noted are filled at the opening of the next season so that all tool caches will be fully equipped in case of need.

Only one fire of threatening proportions has occurred on the Company's holdings since 1909. This fire, which burned over an area of about 160 acres, was placed under control before much damage was done. A large number of fires have started but they have all been

smothered in infancy and confined to a fraction of an acre.

The total cost of protection to the Company for the season of 1913 was \$906.86. This amount prorated over the total acreage gives a protection cost of \$0.023 per acre.

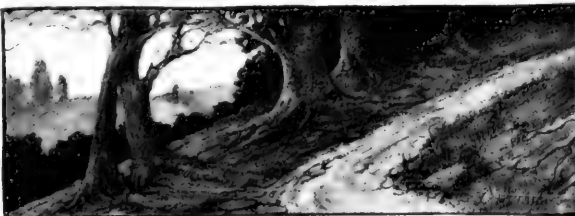


WHAT IS IT?

A FLORIDA MONSTER

Although the palmetto swamps of Florida harbor moccasins, rattlesnakes and other reptiles, a sight such as is shown in the accompanying photograph is very unusual, and was quite a shock to the hunter who suddenly came upon

this scene. However, investigation proved that the enormous reptile was quite harmless, being a magnolia tree that has grown into this very unusual shape.



THE CANADIAN DEPARTMENT

By ELWOOD WILSON

Mr. R. H. Campbell, Chief of the Dominion Forest Service, has been made an honorary member of the Royal Scottish Arboricultural Society and has gone to Scotland to receive this honor.

On account of the war, the Canadian Forestry Association has postponed the convention, which was to have been held in Halifax in September.

The following executive committees have been elected by the Canadian Society of Forest Engineers. Maritime Provinces and Quebec, G. C. Piche, A. Bedard and R. B. Miller. Ontario, Clyde Leavitt, T. W. Dwight and J. H. White. Prairie Provinces, Norman M. Ross, W. Alden and L. M. Ellis.

A very curious incident happened to one of the fire-rangers of the St. Maurice Forest Protective Association last week. He was proceeding down the Mattawin River in a canoe and was just about to land at a portage around a rapid when a large cow moose with two calves came out on the bank and started into the water to attack the canoe. The men shouted and tried to drive her away, but she kept on coming into the water and in trying to avoid her the canoe was caught and swept down the rapids, swamping it, and the men barely escaped with their lives, losing part of their baggage.

The Forest Products Laboratory of Canada, located at McGill University, in Montreal, will be in charge of Dr. J. S. Bates, assisted by Mr. O. F. Bryant, B. S. There will be a complete outfit of paper making machinery and every effort will be made to help Canadian Manufacturers in the solving of their problems.

The town of Hearst, in Northern Ontario, was wiped out by a forest fire on June ninth. The loss was about

\$50,000. There had been small fires in the neighborhood for some time, but no attention was paid to them. The fire protection system in Ontario leaves much to be desired.

The Forestry Division of the Laurentide Co., Ltd., has just finished a survey and map of 2350 square miles showing all drainage, roads, portages and trails, lookout stations, telephone lines and timber conditions. This is the first complete map ever made of this section and in order to be of use about 500 square miles of contiguous territory has been mapped. The average error of closure of traverses is one in 300 and the scale of the finished map is two miles to the inch. Maps of each section of 50 square miles on a scale of three-quarters of a mile to one inch have also been completed showing the location and amount of green timber, the burnt and cut over areas, etc. This Company is also importing reindeer from Dr. Grenfell's herd in Newfoundland to take the place of sled dogs which are very troublesome to keep in summer and are not very efficient in winter. This experiment is being watched with much interest. If successful some of these deer will be supplied to the Indians who are finding the game supply getting pretty short.

Dr. B. E. Fernow and Messrs. Leavitt and Wilson were the guests of Mr. W. R. Brown and the Eastern Foresters' Society, at Berlin and Gorham, N. H., and had a most enjoyable time.

The Quebec Government will sell at auction during these months some large timber tracts and some valuable water powers.

The area of British Columbia is 243,000,000 acres, of which approximately 125,000,000 acres is capable of producing merchantable timber. Actually the

virgin forest on all but 30,000,000 acres has been destroyed by fire in the last 60 years. Had no fires occurred the stand of timber would amount to over 1,000,000,000,000 feet B. M. The actual amount is 350,000,000,000.

Timber lands, bearing over 8,000 feet B. M. per acre west of the Cascades, and 5,000 feet B. M. per acre East of the Cascades are reserved by law from alienation from Government ownership. Prior to 1911 timber lands were disposed of by lease or license, by the terms of which the Government retains a royalty interest and the right to regulate cutting. When cutting is completed the land reverts to the Government. About 10,000,000 acres were disposed of in this way. At the present time timber is disposed of only by sale; the conditions being almost identical to those in effect on the U. S. National Forests.

British Columbia obtains an annual revenue of \$2,500,000 from its forests. It expends for forest administration over \$200,000 and for forest protection over \$300,000 annually.

The present annual cut from Provincial Forests is 1,200,000,000 feet B. M. per annum of logs, shingle bolts, cordwood and pulpwood.

The Forests are administered through 11 District Foresters, whose districts, occupy 15,000,000 acres gross, covering all the settled portion of British Columbia outside the Dominion Railway Belt. The District Foresters are assisted by 36 Rangers and 6 Forest Assistants.

The Protection Force consists of about 200 Forest Guards employed for the whole of the fire season from May

1st to October 1st; 100 patrolmen in the dangerous months of July and August and 40 patrolmen on railway construction.

The Dominion Railway Belt, an area of about 11,000,000 acres, extending across the province 20 miles on each side of the C. P. Ry., is under the administration of the Dominion Forestry Branch (forest reserves) and the Dominion Crown Timber Branch (timber leases and licenses). They employ a total protection force of about 100 men.

The railways under operation in British Columbia, as the Canadian Pacific Railroad, Grand Trunk Pacific, Great Northern Railroad, make fire protection a part of the work of all their outside force, and the sole work of a special force of railway patrolmen, totalling about 50 men.

An important measure of co-operation has been secured through the appointment by the B. C. Forest Branch of various men such as Fire Chiefs of Municipalities, Public Road Superintendents, etc., as Acting Forest Guards, to a total number of about 40.

A few of the larger timber owners employ private guards on their holdings.

Altogether there are in the Province over 500 men whose duties are chiefly fire protection and another 500 men whose duties are in part fire protection.

The British Columbia Fire Protection Service has issued small pocket whetstones in attractive form to Boy Scouts and others with a warning about setting fires on the back. This is a very good move.



EDITORIAL

DESPITE the financial stress and the business uncertainty due to the European war the responses to the request of the American Forestry Association for subscriptions to its \$50,000.00 bond issue have been highly satisfactory. A number of members have already subscribed from \$10 to \$100 and several subscriptions for larger amounts have been received. The total is steadily growing, but it has a long distance to go before it reaches the \$50,000.00 mark. Members who have not done so already are asked to give the project their careful consideration. Letters describing the bonds and for what the money derived from their sale will be used, will be received by every member, and it is hoped that the subscriptions will come in steadily.

It is far from a good time to sell this class of bonds, but it is believed that the members of the Association are so interested in the importance of

its work and the need of extending it, that the entire issue will be taken.

Members of the Association and all persons interested in forestry who subscribe for these bonds should do so primarily for the purpose of helping and forwarding the cause of forestry. While the present excellent financial showing of the Association, and the results that are being attained by its magazine, AMERICAN FORESTRY, have encouraged the directors to make this bond issue, and there is good business prospect that the bonds will pay interest and principal, they should be taken rather as a means of aiding the cause with a fair prospect of recoupment, than as an assured investment based on real estate security, for the security depends upon the continued growth of the forestry movement and the financial success of the magazine—and this bond issue is made specifically to raise funds to better and popularize the magazine and to enlarge its field of teaching and usefulness.

AS A RESULT of the war in Europe there is almost certain to be an exceptionally large demand for forest products from both the United States and Canada. While some lumbermen and lumber manufacturers may until peace is restored find business dull, they should take advantage of this dullness to prepare for full capacity production when the war is over. If the European market is for the present largely cut off, the South American market is wide open and there should be and there are many ways in which forest products hitherto exported to Europe in large quantities can be diverted now to the markets to the south of us. When the war is over an enormous boom in trade of all kinds is expected and the better prepared the dealers in forest products are, the greater will be their gain.

The exceptional demand, when it does come, should, among other things, serve to impress upon timberland owners the necessity for protecting the forests against fire, providing where it is practicable, for new forest growth, greater utilization of timber and general conservation of our forests.

One effect of the war which will not be felt for some years will be the need, ultimately, of replacing timber of various kinds which has now to be used without being treated with preservatives, because the supply of creosote from Germany has been cut off. Railroads which have millions of ties on hand awaiting treatment will doubtless be compelled to use quantities of them untreated, as it may be some months before they can secure a new supply of preservatives.

ATTENTION is called to the article on another page about the new roadside tree law in Maryland, a law which should be adopted by every other state in the Union. Nothing adds to the beauty of our roads as much as fine shade trees and as there are hundreds of thousands of roads along which there are few if any trees and where trees could readily be grown, the opportunities for the adoption and enforcement of a road tree law in other states, should not be overlooked. While it would take years

to accomplish it is not beyond the bounds of possibility that many who are now alive will live to see every main road and every road cross country lined with fine trees which are either the property of state, county or municipality. Already the women of the country are interested in a project to plant trees along the proposed Lincoln Highway from ocean to ocean, and if the women remain interested the success of the movement is practically assured.

ALABAMA needs a state forestry department, and if the efforts of John H. Wallace, Jr., the State Game and Fish Commissioner, and the American Forestry Association are successful, one will be created. Mr. Wallace will embody in his annual report to the Governor and the Legislature, which is now being prepared, an earnest recommendation for the passage of a bill providing for a forestry department, the appointment of a state forester and a liberal appropriation for the work to be done. The American Forestry Association has furnished the draft of a bill suited to Alabama's needs to Mr. Wallace, and this will be included in the report.

These, of course, are but the preliminary steps. Before the bill can pass the people of the state must be told why the state needs a forestry department and how it will directly or indirectly benefit every resident; and the members of the legislature must be convinced that there is immediate need of the bill being passed.

It is in this work that the American Forestry Association can best participate. The success of any forestry bill depends upon educating the citizens and the legislators, and there are so many and convincing arguments why Alabama should have a forestry depart-

ment, and in fact why every state should have one, that it will not be difficult to show the people how they and the state will benefit. With the management of the state timber lands under the control of an efficient state forester and with a forestry department which will teach the owners of timberlands, wood lots, and single trees how to take the best care of them; how to derive the best financial returns from timberlands; how to make woodlots useful and remunerative and how to grow shade trees and foster them; the citizens of the state will derive practical benefits from the department which will make them sorry they were not wide awake enough to create such a department many years ago.

Commissioner Wallace has recommended forestry bills in previous reports, but nothing has come of the recommendations. Now, however, when the state legislature meets in January it is expected there will be such an insistent demand for a forestry law that the members of the law creating body cannot possibly ignore it.

In Virginia last spring, following a campaign of education conducted by the American Forestry Association a forestry bill passed the Senate unanimously and the House by a vote of 86 to 3, and if this can be done in Virginia it can also be done in Alabama.

AN aggressive campaign is now under way in Minnesota to secure the passage of an amendment to the State Constitution which will enable the state to retain state lands suited only for forests, instead of selling all such land as now provided by the Constitution. If this amendment passes it will be the inauguration of a true forest policy for the state. The Minnesota State Forestry Association is directing the campaign and has enlisted most of the newspapers and most of the progressive organizations of the state in the fight.

The campaign is directed chiefly to arousing the voters, impressing them with the need of this forestry amendment as it is called, and urging them to vote for it. So well has the campaign been planned and so ably is it being conducted that its success is practically assured.

Summed up, the situation is this: The State of Minnesota originally owned eight and a half million acres of land. Under the State Constitution, all of these lands were to be sold on the assumption that all were fit for farming. When the big pineries were removed, much of that land was found

to be so rocky and gravelly as to be entirely unfit for farming, and that land having now been cut over and burned over, will become a barren waste, unproductive, paying no taxes, a burden to the community and a bad advertisement to the state.

The issue now is this: Shall the state go ahead and follow the old policy which is now known to be partly wrong or shall it adopt another method of managing the state lands? The legislature has seen the urgent necessity of departing from the old mistaken ways and has proposed a remedy, which is embodied in No. 9, the State Forests Amendment.

This amendment provides that all those state lands which are better suited for tree growth than for farming, shall not be sold but be used as State Forests.

Nine out of ten amendments in Minnesota usually fail, and in order to make the average voter realize the fact that there is a forestry amendment to be voted on, and that it is up to his interests that this amendment pass, it is necessary that an extensive campaign be conducted.

AN HONEST FOREMAN

Lines penciled on the wall of a flag station near
RAQUETTE LAKE, NEW YORK

The hiker stood on the cross-arm,
The foreman on the ground,
Said the hiker to the foreman,
"Do we quit when the sun goes down?"

"No, no," said the company's foreman,
"We work until 'tis dark."
"If that is the case," said the hiker,
"I'll take my time and start.

I'll travel the wide world over,
I'll roam from town to town
Until I find an honest foreman
Who will quit when the sun goes down."

—Transcribed by E. M. Price.



FOREST NOTES

In the effort to prolong until 1926 the operation of the Weeks law for the acquisition of forest lands and coöperation with states in fire protection work Representative Sells, of Tennessee, has introduced a bill in the House. Its chief provision is as follows:

"There is hereby appropriated for the fiscal year, ending June 30, 1916, the sum of \$3,000,000 and for each fiscal year thereafter a sum not to exceed \$4,000,000, for use in the examination, survey, and acquirement of lands located on the headwaters of navigable streams, or those which are being or may be developed for navigable purposes, provided, that the provisions of this section shall expire by limitation on the thirtieth day of June, 1926."

R. D. Maddox on the first of September took charge of the new forestry department of Tennessee which is under the direction of the State Geological Department. Mr. Maddox will study the forest conditions of the state and advise the lumbermen and other owners of timber land as to the management of their timber land. He will also study the problem of the reclamation of the gullied lands of East Tennessee.

Mr. Maddox is a native of Lincoln County, Tennessee, a graduate of the Yale School of Forestry, was for several years a member of the Bureau of Forestry of New Hampshire and was last year in the Department of Forestry at the State College of Pennsylvania.

At a recent meeting of the Forest Products Exposition Company it was decided that another large exposition should not be held in Chicago or New York during the coming year, because of the complications created by the San Francisco Exposition, and for other reasons, but it was recommended that plans for the holding of the same in the year 1916 be inaugurated as early as practicable.

The firm of Fisher & Bryant, consulting engineers, has been dissolved, and the business has been taken over by George T. Carlisle, Jr., with headquarters at 386 Hyde Park Ave., Roslindale, Mass., a well-known forester. Mr. E. S. Bryant, one of the members of the former firm, is now with the Forest Service and is stationed at Washington, D. C.

As a part of a systematic campaign for forest fire protection which the forest branch is conducting in British Columbia under the direction of H. R. MacMullen, chief forester, 1,000 pocket whetstones are being distributed among the boy scouts of British Columbia. On the reverse side of the whetstone is the inscription: "Build Camp Fires in Safe Places. When You Leave Put Them Out. Boy Scouts be Prepared. Help Protect Our Forests." Altogether more than 50,000 circulars, posters, pictures, pocket whetstones, etc., have been distributed all over the Province to lumbermen, woodsmen of all kinds, newspapers, banks, hotels, stores, clergymen, school children, etc., and the response has been most gratifying.

A report from Bangor, Me., says ten steel lookout towers for Maine forests have arrived and will be at once installed on the following mountains: Mattagamon, Trout Brook and Beetle on the East Branch of the Penobscot; Mattamiscontis, on Penobscot waters; Three Brooks in the Squa Aroostook; Kennebago, near Rangely; Mulhedus on the southwest branch of the Penobscot above Moosehead; Ragged and Sourdnhunk, in from Norcross. This makes a total of thirty steel and three wooden towers that have been put up this year in addition to ten portable houses located where towers were unnecessary.

A movement is on foot at Shreveport, La., to make it possible for the school children of that city to secure an education in tree knowledge. It is the intention of those behind the movement to have on hand at all times samples of all trees in the bark and after being manufactured so that the school children may acquire a knowledge that may be of use to them in later years. Another movement on foot in that city is to have all of the trees adorning the highways of the city labeled so that not only the children but grown people will be able to ascertain the difference between the various kinds of southern trees.

Prof. Alfred Akerman, of the College of Agriculture at Athens, Ga., writes: "I am leaving the College of Agriculture here at Athens this fall, for a timber tract in Greene County. My work will be reorganized along somewhat different lines, greater emphases being placed on the outdoor part of the curriculum. Over 900 acres have been secured in Greene County and another place of 300 acres in Towns County on the other side of the Blue Ridge. For the present the place in Towns will be used only for summer camps. A sawmill is to be put on the Greene County tract and the forest is to be worked on a business basis, but also with a view to its use by the students for experimentation. A site for a winter camp has been secured in Florida. It

is proposed to mount the students, beginning next year, and to make the trips to the mountains and to Florida on horseback. The course is to be of three years duration. One of the terms is to be spent in Towns and one in Florida. This will give the men a chance to study all of the important timber trees of the eastern part of the United States, except the spruce. At present there are no buildings on the headquarters place in Greene County, and tents will be used until some bungalows can be built.

I have dreamed for five years of a forest school in the woods, and now my dream is taking shape.

Owing to the war the president and directors of the Canadian Forestry Association have, after the most careful consideration, decided to cancel the arrangements for the forestry convention which was to be held in Halifax, September 1 to 4, 1914, and to postpone the convention indefinitely. Whatever it is decided to do in the future, due notice will be given thereof to the members and all others concerned.

The New York Conservation Commission is making exhibits at thirty fairs in New York State. These exhibits consist of sample forest plantations and planting material. A representative is present at each one of these places to give information in regard to reforestation, taxation, handling woodlots, etc. Literature along these lines is also distributed.

A tabulation of the forest fires in New York State, completed August 10, shows 208 fires, 9,650 acres burned, causing \$6,304 damage, and costing \$6,463.24 to extinguish. It is interesting to note that as usual practically all these fires were due to carelessness. Smokers caused seventy-seven; fishermen, thirty-eight; railroads, forty-one; campers, eleven. The commission is endeavoring to reduce the danger of fire from this cause by increasing its educational work and by prosecuting people who cause fires negligently. Considerable anxiety was felt recently on

account of the heavy pall of smoke which overhung the Adirondacks. This smoke was not due to fires within this territory, but on account of the forest fires in the province of Quebec.

F. A. Gaylord, who for the last four years has been one of New York State's foresters, has resigned his position and accepted appointment of the Nehasane Park Association. He will have charge of the property and will plan and carry on lumbering operations.

Four hundred and sixty thousand feet, nine hundred and ten logs have been loaded on seventy cars in a nine-hour day! That's five logs every three minutes throughout the day, or eight hundred and fifty-two feet a minute. This splendid record was made by Loaderman A. B. Cochran for the Gulf Lumber Company at Fullerton, La. A stiff-boom McGiffert Loader was used. The rest of this record-breaking crew consisted of W. A. McCormick, fireman; Dock Jordan, Will Kile, Red Bass, Bob Franklin, and Charles Revels.

Montana's new School of Forestry opens its doors on September 8. Full courses in scientific forestry and in logging engineering are to be in the hands of expert instructors, and no effort will be spared to provide for all students the best and most practical and up-to-date courses of instruction. The new School of Forestry is a department of the University of Montana, located at Missoula. The location is peculiarly advantageous in its relation to the work of the federal forest service, and its position in a forest region of great importance, both scientific and economic, and in the special opportunities offered in a new and rapidly growing section of the country. Mr. Dorr Skeels, an expert logging engineer of the forest service, has been selected dean of the school.

The State of New York will be one of the greatest forest producing states of the Union because nearly half of the

land surface is better suited to the growing of forests than any other crop from the soil. Furthermore, its forest area is surrounded by waterways leading to the best of markets and it does not have the severe topographical difficulties met with in forest areas of the Appalachian and Rocky Mountain sections. The practice of Forestry on these forest lands will be simple because of ease of access, right climatic and soil conditions and nearness of market. On lands not nearly as well suited to the growing of forests as the half of New York which is essential forest land, the countries of Europe are producing from two to five dollars per acre per year from forests.

Richard James Donovan, of New York City, whose interest in tree planting in the Adirondacks was described in the August *AMERICAN FORESTRY*, writes in regard to the planting of 100,000 white pine and Scotch pine: "I have just returned from a couple of weeks' visit to the plantation and I find that of the Scotch pine planting this year not more than 1 per cent have died and of the white pine not more than 5 per cent. The white pine is far more delicate than the Scotch pine. If the white pines are planted in open grounds without any saplings or cover of undergrowth on light pure soil, they are a little difficult to get started and some of them will die, but if they have cover of small trees or saplings such as white birch or poplars and bushes of any kind, so that during the first few years after they are planted they have shade very few of the trees die. The white pine tree in its youth needs the shade. The Scotch pine may be planted in pure white sand and exposed to the sun and more than 90 per cent of them will live. This has been my experiences in planting 365,000 pine trees in the Adirondack Mountains.

The National Conservation Congress which meets in its sixth annual session at New Orleans November 10-14, will devote its chief consideration to three leading topics, floods and their damage,

the conservation of wild life, and child welfare.

The directors of the American Forestry Association have decided to hold their fall meeting at New Orleans at the time the Congress is in session.

Tree planting exercises have been or are being held in all parts of Chicago, about 250,000 white pine seedlings being provided for yards, vacant lots and roadways. Last years 200,000 elm seedlings were planted; the year before 300,000 Russian mulberries, and in 1911 a total of 280,000 catalpa seedlings were given a chance to grow. If all these grew Chicago would be not a garden city, but a forest city. The mortality rate among seedlings in Chicago, says the *Chicago Herald*, however, is almost as great as it is among slum babies. If a respectable fraction of these young trees grow to maturity Chicago will be in time a woodland paradise. An authority on arboriculture as applied in cities, says the ratio should be one living shade tree to every five inhabitants. In the absence of a tree census it is impossible to say how near Chicago approaches this ideal.

The New York State College of Forestry at Syracuse has estimated that the utilization of the maturing and dead timber on the New York State Forest Preserve of something over 1,600,000 acres should yield a revenue

of over \$1,000,000 every year and this without impairing the value of the forest for future timber supply and watershed protection. This is saying nothing of a common-sense use of thinnings from the growing forest crop. New York is losing a very large revenue annually through not using its forest lands.

Carl Schwiz Vrooman was sworn in as Assistant Secretary of Agriculture on August 17, succeeding Dr. B. T. Galloway. Mr. Vrooman was born in Macon, Mo., October 25, 1872. He attended Washburn College, at Topeka, Kan., and later was graduated from Harvard University, in 1894. He also attended Oxford University. Mr. Vrooman began writing on publicity questions as early as 1894, and has contributed to some of the prominent magazines. He is the author of several books, including "Taming the Trusts," published in 1900, and "American Railway Problems," in 1910. Mr. Vrooman, by reason of seven years spent abroad investigating social and economic conditions, and by reason of scientific farming conducted on his large estates in Illinois, is declared to be peculiarly fitted for the position vacated by Dr. Galloway. For a number of years Mr. Vrooman has been carrying on his scientific farming near Bloomington, Ill. He started with about 2,000 acres of land, and today has nearly 6,000 acres under cultivation, it is said.

BOOK REVIEWS

Mechanical Properties of Wood by Samuel Record, M. A., M. F. (John Wiley & Sons, Inc., 165 pp. Price, \$1.75). Mr. Record is the assistant professor of Forest Products at the Yale Forest School, and the book was written primarily for students of forestry to whom a knowledge of the technical properties of wood is essential, but it is believed that it will also prove a valuable text for students of civil and mechanical engineering. The mechanics involved is reduced to the simplest terms and without reference to higher mathematics, with which the students are rarely familiar. The intention throughout has been to avoid all unnecessarily technical language and descriptions, thereby

making the subject matter readily available to everyone interested in wood. In Part I the numerous tables giving the various strength values of many of the important American woods demand attention. Part II will interest all who are concerned with the rational use of wood, and to the forester also, to whom it will suggest means of regulating his product. Part III gives the methods of timber testing for the most part followed by the U. S. Forest Service. The Appendix should also prove of value in its suggestions to the independent investigator, while the Bibliography adds considerably to the worth of the book.

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Vol. 20

OCTOBER, 1914

No. 10

FISH FOR THE FORESTS

PRACTICAL TREE SURGERY

A FOREST OF STONE

FORESTS, LUMBER AND CONSUMER

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WHAT IS A NATIONAL FOREST?

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The Magazine of the American Forestry Association

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CONTENTS

1914

FISH FOR THE FORESTS—By L. F. Kneipp.....	697
With nine illustrations.	
SMALL-FIRE LOSS.....	706
A FIRE GUARD ON PATROL—Poem by J. D. G.....	707
A STUMPER OF A FENCE—By Edward F. Bigelow.....	708
With one illustration.	
A FOREST OF STONE—By F. H. Knowlton.....	709
With nine illustrations.	
PRACTICAL TREE SURGERY—By J. Franklin Collins.....	719
With thirty-three illustrations.	
STUDYING THE LUMBERING INDUSTRY.....	730
WEST VIRGINIA FIRE PROTECTION.....	731
A SAFE CAMP FIRE.....	732
With one illustration.	
A WHITE MOUNTAIN PURCHASE.....	733
With one illustration.	
WHAT IS A NATIONAL FOREST—By T. W. Venemann.....	735
With five illustrations.	
BERKS COUNTY CONSERVATION.....	740
With six illustrations.	
FILIPINO FORESTERS.....	743
With one illustration.	
FORESTS, LUMBER AND CONSUMER—By E. T. Allen.....	745
With one illustration.	
CONSERVING NATIVE ALASKANS.....	751
With one illustration.	
BOYS MAKE BIRD HOUSES.....	753
With six illustrations.	
A CATALPA GROWTH.....	756
With one illustration.	
CANADIAN DEPARTMENT—By Elwood Wilson.....	757
EDITORIAL.....	759
FOREST NOTES.....	762
CURRENT LITERATURE.....	765

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MAC KINTON

American Forestry

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OCTOBER, 1914

No. 10

FISH FOR THE FORESTS

By L. F. KNEIPP

PROGRESS in the actual administration of forested areas within these United States brings a growing realization that there are other products of the forest besides timber, forage and water-power. There is, for example, that in-

estimably valuable product—health; health of body and of mind. No individual citizen can spend a fortnight in a national forest without having a more hopeful outlook upon life, a higher mentality, a more vigorous body. The development of the recreational aspects



A WONDERFUL TROUT STREAM.

THE MCCLLOUD RIVER IN SISKIYOU COUNTY, CALIFORNIA, IS ONE OF THE BEST TROUT STREAMS IN THE COUNTRY. IT FLOWS FROM THE ETERNAL SNOWS AND GLACIERS OF MT. SHASTA AND CONTAINS THE FAMOUS DOLLY VARDEN AND RAINBOW TROUT.



THE VALLEY RANCH.

THIS IS ON THE PECOS NATIONAL FOREST, NOT FAR FROM SANTA FE, NEW MEXICO. THE PECOS RIVER FLOWS AT THE FOOT OF THE BLUFFS IN THE BACKGROUND AND IS A NOTED TROUT STREAM. DEER AND OTHER GAME ABOUND IN THIS REGION.

of the national forests makes for better citizenship and deserves encouragement.

Relaxation within a forest if only during a very brief period inevitably awakens man's primitive instincts of the chase no matter how dormant they may have been. But the big game has almost passed away; the pitiful remnant is rigidly protected by laws strictly enforced, and the fall and winter are the only times to hunt. The summer camper therefore, who wishes to give a demonstration of reversion to type has only one outlet for his energies, one way in which to display his skill in woodcraft; that way is to fish; to whip the roaring mountain torrents for trout, or to troll in the more slowly moving streams for bass, to be rewarded perhaps by suckers, or whitefish, or even an humble and not wholly attractive juajolote.

But aside from the question of healthful sport there is another consideration and that is the economic value of the waters within the forests for purposes of food production. The forests contain thousands of bodies of water

ranging from tiny blue alpine lakes nestling under the highest peaks to rivers carrying the waters of a hundred good-sized tributaries. Properly planted and protected these waters will support numbers of fish so enormous that they will occupy an important place in the national diet. In many parts of the west private fish hatcheries and ponds are now being operated on a commercial basis and it is certain that the production of fish under controlled conditions will some day be an important industry.

The number of persons who annually visit the national forests to fish is difficult even of approximation, but it runs into the hundreds of thousands. In Colorado alone 10,000 people, it is estimated, went fishing on the opening day of the season of 1913. Probably more than half of this number spent the day within the National Forests. Each year sees an increase in the number of campers and fishermen and it may safely be predicted that within a few years over one million people will visit the forests each year.



ALONG A FAMOUS TROUT STREAM.

THE SUMMER HOME OF JOHN W. RINCKEL ON THE MCLLOUD RIVER, SHASTA NATIONAL FOREST, CALIFORNIA. THIS RIVER IS FAMED FOR ITS WONDERFUL TROUT FISHING AND IS ONE OF THE FEW STREAMS WHERE THE DOLLY VARDEN TROUT ARE FOUND. THESE, AND RAINBOW TROUT, ARE LARGE AND PLentiful.

Unfortunately there is a very definite limit to the number of fish that a given body of water will support. A stream may become overstocked just as readily as a pasture and, so far as the stock are concerned, with as disastrous results. Then, too, there are many obstacles to full natural reproduction so that the fish cannot reproduce as fast as they are captured or destroyed. To these difficulties may be added the losses caused by cloudbursts which sweep the fish from the streams, or by drouths that leave the fish stranded in small pools in which they finally perish, or by unscreened irrigation ditches, through which the fish are carried into field and meadows, where, of course, they die, or by the pollution of streams by mill tailings, sawdust, coal dust, or sewage. Another fruitful cause of loss are laws which

allow fishing before or during the spawning season. In this connection it should be understood that fishermen and hunters in the national forests are subject to the game and fish laws of the States in which the forests are situated. Excessive fishing is in itself sufficient to deplete a stream, but when it is coupled with one or several of the complications enumerated, the fishing value of the stream is temporarily and all too often permanently destroyed.

During the past three years the considerations mentioned have led certain of the national forest districts to give increasing attention to the question of replenishing depleted streams and stocking the bodies of water which are capable of supporting fish life but do not contain fish. Examples of private enterprise have demonstrated most conclusively that a small expen-



COTTONWOOD CAMP.

DEEP IN THE DENSE SHADE OF THE BIG TREES ALONG FOUR MILE CREEK ON THE EAST SLOPE OF THE CASCADES, CRATER NATIONAL FOREST, OREGON.

diture of time and energy is productive of large results as, for example, in the case of Dad's Lake on the Washakie Forest where a nosebag full of trout fry carried from Big Sandy in 1903 has resulted in a lake now teeming with choice fish. At first the interest in the subject was individual, later it extended first to forest and then to district organizations until at present the recommendations for planning operations threaten to exhaust the total capacity of all federal hatcheries and must necessarily be subject to selective processes by the Bureau of Fisheries.

It is not the intention of the Bureau of Fisheries to furnish in any case a number of fish greater than that required to form the nucleus of a brood stock which, if properly protected and afforded opportunity to reproduce, will

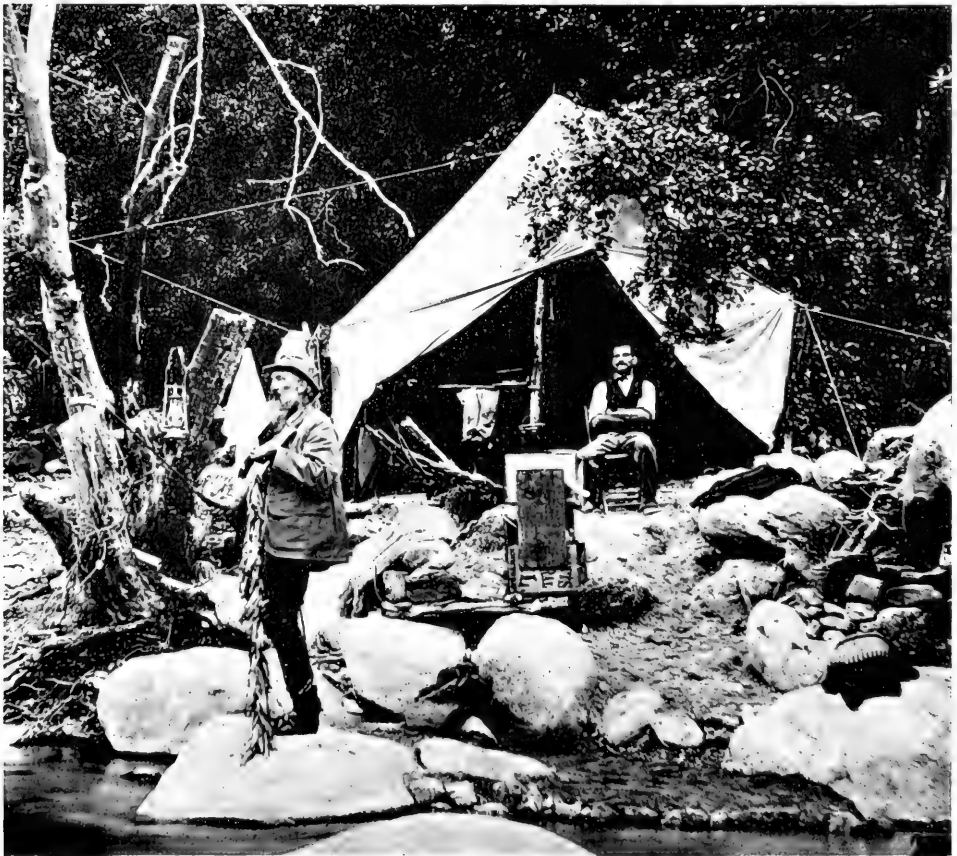
in course of time stock the stream in a natural way. The Forest Service, unfortunately, lacks the authority to protect the fish during the period of establishment and as a natural sequence many of the planting operations are only temporarily effective, yet, while the results are not so good as they would be if it were possible to protect parts of streams to provide spawning grounds and allow the fish to attain a fair size they still are sufficiently successful and encouraging to justify the work.

The first step in restocking is the determination of the length, width and depth of the body of water to be stocked, its sources and outlet, its temperatures, the character of the bottom, the kinds of vegetable life it contains, the rapidity of flow, character of lands traversed, and the kinds of fish already

there. One should also know the dates of previous plantings with kinds of fish used, and degree of success or non-success; also the extent to which the stream is polluted by sawdust or other deleterious substances; the principal kinds of food of the fish; number of irrigation ditches and extent to which they are screened. With such data before it the Bureau of Fisheries can determine approximately the number and kind of fish which should be allotted. In some cases the kind of fish requested is not adapted to the waters to be stocked, sometimes because the food supply is unsuitable and frequently because the introduction of the fish applied for would be detrimental to the kinds which the waters already contain. The Bureau of Fisheries will

not, for example, furnish spiny finned fishes such as the bass or perch for introduction into waters containing trout or salmon, nor will trout or landlocked salmon be allotted for waters containing voracious fishes such as bass or pickerel. Only one application will be considered for any particular body of water and only one species of fish will be assigned an applicant during any one season. These are simply illustrative of the factors which guide the Bureau of Fisheries in its allotments of fry.

The majority of the waters within the forests are turbulent mountain streams or icy alpine lakes, consequently trout are in stronger demand than any other species. The blackspotted trout which is native to the Rocky



A FISHING CAMP.

THIS IS ON THE ANGELES NATIONAL FOREST IN CALIFORNIA. THE LONG STRING OF FISH IS AN INDICATION OF THE QUALITY OF THE SPORT.



FERTILIZING TROUT EGGS.

AFTER A QUANTITY OF SPAWN HAVE BEEN STRIPPED INTO A RECEPTACLE THE EGGS ARE FERTILIZED BY STRIPPING A MALE FISH OVER THEM. THE SCENE IS AT SEVEN LAKES IN THE PIKE NATIONAL FOREST, COLORADO.

Mountain region is propagated in relatively large numbers and liberal allotments are made, but there is a heavy demand for rainbow and brook trout that can not always be filled since the Bureau's facilities for propagating these species in the Rocky Mountain region are comparatively limited. Bass are in good demand, and Forest officers seeking originality or recalling memories of boyhood days will even petition for the humble catfish and the lowly carp, to say nothing of suckers, sunfish, and other modest members of the finny tribe. These applications must stand the acid test of the Bureau's experts before they receive approval.

At last the application is approved and the Ranger designated has received the post card and telegraphic announcements of the day, hour and minute upon which the fish car will arrive at the appointed spot. In almost every

case the Ranger before submitting the application solicits the cooperation of the leading disciples of Izaak Walton in the particular locality to be benefited. In practically all cases this is given in ungrudging measure for there is increasing realization of the fact that fish planting work is beneficial both to the individual and the community. So as the moment set for the arrival of the fish car draws near there is around the depot quite a congregation of automobiles, where they can be used, or of light rigs drawn by fast teams, or in some cases of packhorses. Whatever the style of conveyance used it generally bears a motley assortment of receptacles for the fry, for while, in cases of emergency, the Ranger may borrow the receptacles from the fish car itself, it is understood that as a rule he will provide all necessary cans.



TROUT FOR RESTOCKING STREAMS.

THE TROUT IN THESE CANS WERE PLACED IN STREAMS IN THE BLACK HILLS NATIONAL FOREST. AS LONG AS THE CANS ARE IN A MOVING VEHICLE THE NATURAL MOVEMENT OF THE WATER IS SUFFICIENT TO AERATE IT.

Almost in a moment the train has come, the fish have been swiftly transferred from the fish car to the waiting vehicles, the Ranger has signed the receipts on the run and the train is gone. From this stage until the fish are finally deposited in the waters for which they are destined the work is exacting and hasty and unerring judgment are essentials of success.

Compared to the bulk of water and number of fish contained the air surface of the ordinary receptacle is altogether inadequate and the water must be aerated. So long as the cans are in a moving vehicle the natural movement of the water is sufficient, but if movement is suspended the water must be dipped up and al-

lowed to drain back at frequent intervals. Sometimes the transportation of fish across low valleys during the heat of the day increases the temperature of the water to such an extent that unless the cans are iced many of the fish will perish. If the fish are held in the receptacles for any length of time the water must be replenished and care must be taken to see that the water is suited to the fish and does not contain alkali or other injurious ingredients. There is imperative need to transport the fish to the point of deposit without delay and throughout its various stages this part of the work is marked by feverish haste. Changes from motor cars to wagons, from wagons to pack horses, are made with the least

possible delay. Finally the distributor must repress all tendencies to display his relief and enthusiasm by pouring out the fish from the height of his shoulder, for this is one way of lessening the chance of success.

If given reasonable care the young fry can be transported over very considerable distances after delivery from

forest only eighteen were known to have died.

In 1911, 34,000 trout were shipped from Rock Springs, Wyoming, to the Bridger Forest, 110 miles via motor-car, followed by a long trip on pack horses. Approximately 50 per cent of this shipment was lost. Another consignment to the Washakie Forest in-



METHOD OF AVOIDING SHOCK TO YOUNG FISH.

BY GRADUALLY POURING INTO THE CAN WATER FROM THE STREAM IN WHICH THE FISH ARE TO BE PLACED, THEY ARE SAVED FROM THE DANGEROUS SHOCK OF BEING SUDDENLY PLACED IN WATER OF QUITE A DIFFERENT TEMPERATURE. AFTER THIS CHANGE HAS BEEN MADE THEY MAY BE PLACED IN THE STREAMS.

the car with a quite small percentage of loss. In one case, on the Shoshone Forest in Wyoming, eight cans of fry were in transit a part of two days and three cans were in transit a part of three days without any loss whatever. Each night the cans, their tops covered with cheesecloth, were placed in running streams with mouth upstream, while proper care was given during the day. Out of 40,000 fry shipped to the

volving distribution by means of pack-horses resulted in a loss of 30 per cent. These figures, however, are not discouraging, for the numbers of fish safely deposited in the waters were sufficient to restock them. As a very general rule the Forest officers fully appreciate the difficulties surrounding the transportation of fish to remote semi-inaccessible waters and do not submit applications unless they are fully



RESTOCKING THE STREAMS.

AFTER THE WATER IN THE CAN HAS BEEN AERATED AND BROUGHT GRADUALLY TO THE SAME TEMPERATURE AS THE STREAM THE FISH ARE GENTLY ALLOWED TO GO INTO THEIR NEW HOME. THIS STREAM IS IN THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.

prepared to take every precaution necessary to secure the successful establishment of the fish.

The work very frequently involves considerable personal sacrifice on the part of the forest officer since the fish car, once it begins its rounds, is no respecter of official hours and a person to whom fish are consigned must be prepared to receive them on very short notice at almost any hour of any day or night. As a result many of the fish are transported and planted at night or on Sundays and holidays and the work is performed with such haste that it really interferes but little if at all with the officer's regular official duties.

The demands from the field have become so numerous that in the district which has led the others in this work steps have been taken to systematize

future operations along this line. A total of 273 bodies of water distributed among twenty-four Forests in Colorado and Wyoming have been selected for restocking during the coming nine years and the number of fish required to supply each separate body has been carefully estimated. According to the plan the initial distribution in 1914 amounts to more than four million fry but a gradual reduction will be made each year in the number planted until in 1922 only six hundred thousand will be distributed. This work, involving little if any cost to the Service and practically no interference with regular work, has proved immensely popular with the people who resort to the forests for rest and recreation and has done much to make the forests more valuable to the public.

SMALL FIRE LOSS

THE fire season in Oregon practically ended with the arrival of general rains which started September 6th. The year will be long remembered as one of the driest ever experienced in the State. For a period of seventy-four days no rain fell and the forest fire situation of necessity became extremely critical. Since Weather Bureau records have been kept in the state (43 years) the longest period of drought recorded prior to 1914 was fifty-seven days. In spite of the long dry period, however, the Oregon Forest Fire Association reports very slight loss of green timber through fire.

A general rain commencing September 6 and continuing for several days, ended the longest period of drought experienced in Oregon during the past fifty years. The fire hazard was further increased by the fact that during the past winter the snowfall in the mountains was extremely light and disappeared fully six weeks earlier than usual.

The conditions during the fire season, therefore, were such as to test out thoroughly the patrol organizations built up during the last four years, and the results have been more than satisfactory. Data sufficient to compile definite figures is not yet available at the State Forester's office, but it is certain that at least 1,200 fires occurred during the season, which is more than the combined total of the previous three seasons. Most of these fires originated in old burns and logged areas and due to the efficiency of the Federal, association and State patrolmen practically all of them were stopped before green timber was damaged. Owing to the extreme dryness, fires were controlled with great difficulty, and more money was spent for this purpose than in any season since 1910.

The patrol force on privately owned land showed an increase of about 100

men over that of last year. This was, in part, due to the Congressional appropriation of \$25,000 for the patrol of the Oregon and California Railroad grant lands, which made it possible to place 46 patrolmen in the field.

Early in August patrols were materially increased, until some 400 State, Weeks Law and privately employed wardens were guarding privately-owned timber.

Fires were numerous, but only in a few cases did they reach any considerable size. The dense smoke resulting from the fires was, however, no considerable handicap to lookout men and wardens generally, as it made prompt detection of fires difficult.

At the present time reports are not available to show the exact damage resulting from forest fires, but it is known to be inconsiderable.

Since 1914 has been the driest summer ever recorded in Oregon, it is the opinion of timber owners generally that it has now been demonstrated that adequate patrol can keep fire from doing damage and makes stumpage an entirely safe investment.

Washington had over 100 fires during August. Some logs have been burned but very little damage to settlers has resulted, and only a small amount of green timber has been damaged. The chief danger until rains come is high winds. Fires started during the season are being carefully guarded, but unusually bad conditions might result in their breaking out and causing damage as well as heavy expense to fight them. Over 200 regular, Association and State wardens, are on duty. No rain fell in July or August and the woods were extremely dry.

Idaho associations have had unusually bad and expensive fires to contend with. Prompt action and the employment of a large number of fire fighters has, however, prevented great loss of green timber. Not less than 200 fires were handled during August, the bulk

of these having been caused by lightning and ranchers burning slashings. Two arrests for failure to secure permit before burnings have been made. With heavy dews and cooler weather the fire-fighting forces controlled all of the fires.

Montana reports an extremely dry and dangerous year. A large number of fires have occurred on Government and private land necessitating the employment of large crews of fire fighters. Numerous lightning fires have occurred and though all fires have been promptly detected and fought, the season will not be one without loss of green timber.

Incomplete reports from California indicate that conditions continue more

favorable than last year, and that fire losses have been light.

The absence of future damaging fires will mark 1914 as the most successful season, taking conditions into account, that has ever been experienced by fire protection agencies. Cooperative patrol has everywhere shown its efficiency and preparations to meet a bad year which have been going forward the past two favorable seasons, have helped during the present dangerous year. Comparative absence of East winds on the Pacific Coast has been the only factor favorable to the work of fire suppression this season, which in many sections is the driest since Weather Bureau records have been kept. Cost of protection will, of necessity, be high in most localities.

THE FIRE GUARD ON PATROL

(With apologies to Danny Deever.)

"What are the bloomin' boxes for?" said the Fire Guard on patrol,
 "To drop a note, to drop a note," the Forest Ranger said.
 "What makes them look so big, so big?" said the Fire Guard on patrol.
 "So they can hold a bushel o' notes," the Forest Ranger said.
 "For you've got to ride around, around, a-lookin' for fires each day,
 You've sure got to hump yourself, if you want to draw the pay—
 This ain't no foolish outin' job, so I heard the Super say,
 For you've got to visit the mail box every morning."

"What makes the country look so blue?" said the Fire Guard on patrol.
 "It's forest smoke, it's forest smoke," the Forest User said.
 "What makes the Rangers ride so hard?" said the Fire Guard on patrol.
 "To reach a fire, to reach a fire," the Forest User said.
 "They're fightin' forest fires, they're whippin' 'em around,
 They're fightin' 'em like devils, they're beatin' 'em to the ground,
 And they'll put you through your paces if they catch you loafin' 'round,
 For you've got to visit the mail box every morning."

"What's that so black against the sun?" said the Fire Guard on patrol.
 "It's forest fires, you bloomin' it," the Forest Ranger said.
 "What's that that crackles o'er head?" said the Fire Guard on patrol.
 "It's fallin' trees, it's fallin' trees," the Forest Ranger said.
 "For the Forest's goin' up in smoke, you can see it fade away,
 We're all goin' to jack our jobs, for we don't need the pay—
 Oh, the Fire Guards are shakin', and they'll get their time today—
 For they didn't visit the mail box every morning."

—J. D. G.



THE ROOT SIDE OF AN OLD FASHIONED STUMP FENCE.

A STUMPER OF A FENCE

By EDWARD F. BIGELOW

AN easterner visiting Michigan is attracted by the stump fences more than by almost anything else. Aside from these stump fences, the farms, the uplands and the marshes are not much different from those of New England. One misses the characteristic stone walls of New England but finds in their place the most novel fences in the world—those made of stumps that have in recent years been pulled out of the ground by powerful machines constructed for that purpose. The force required to pull such stumps from the ground is enormous, but it is applied slowly, in submis-

mission to the decree of Nature that what is gained in power must be lost in speed. These stumps are relics of the liveliest lumbering ever seen anywhere else in the United States and that ended about thirty years ago, in Big Rapids, Grand Rapids and their vicinity. Old-timers entertain the visitor by the hour with reminiscences of the amazing number of logs that were cut in that region. Logging somewhat similar, but not nearly so extensive, still continues in the northern part of Michigan, but does not equal in extent nor in picturesqueness that which formerly took place on the famous Muskegon River.



A FOREST OF STONE

By F. H. KNOWLTON, *United States Geological Survey*

REMARKABLE fossil forests exist in Yellowstone Park, the most remarkable, it is believed, of the several fossil forests which have been discovered—there are others in Egypt, in California and in Arizona—because in the Yellowstone most of the trees were entombed in their original upright position and not found recumbent and scattered about the ground. In Arizona, for instance, the fossilized trunks have evidently been carried a long distance from where they originally grew. In the Yellowstone the trees now stand where they grew, and where they were entombed by the outpouring of various volcanic materials. Now as the softer rock surrounding them is gradually worn away they are left standing erect on the steep hillsides, just as they stood when they were living; in fact, it is difficult at a little distance to distinguish some of these fossil trunks from the lichen-covered stumps of kindred living species. Such an aggregation of fossil trunks is therefore well entitled to be called a true fossil forest. It should not be supposed, however, that these trees still retain their limbs and smaller branches, for the mass of volcanic material falling on them stripped them down to bare, upright trunks.

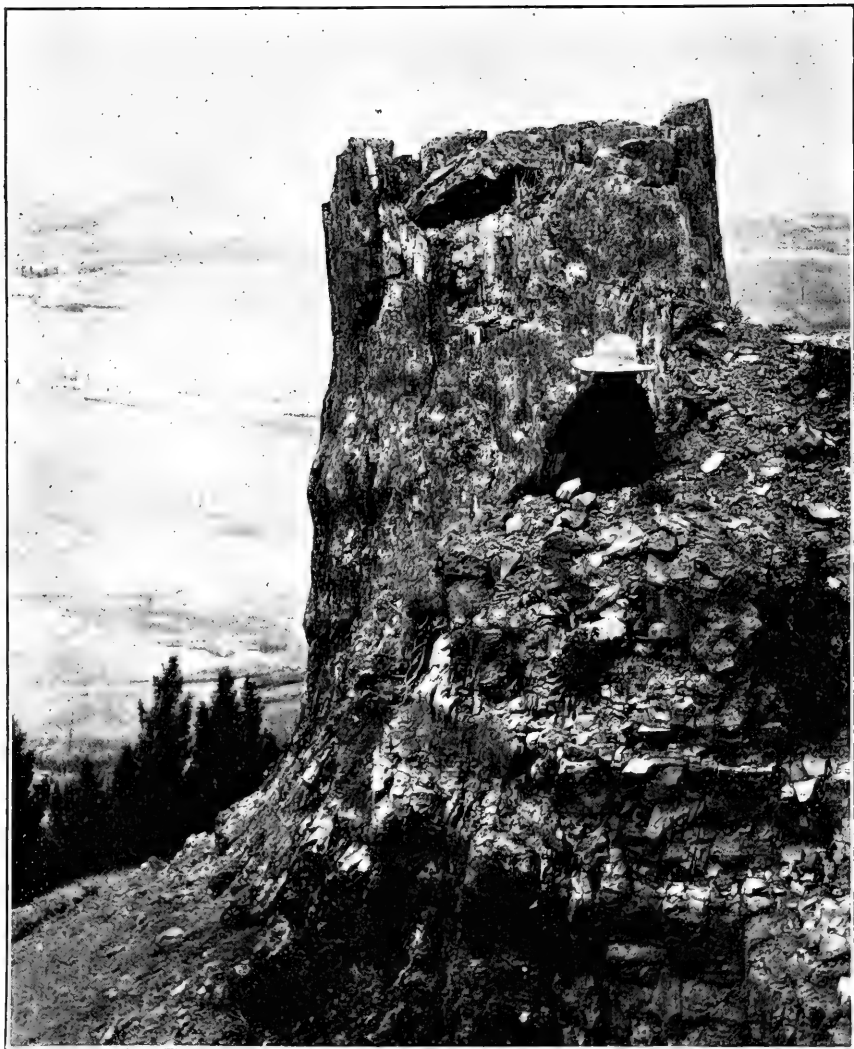
These fossil forests cover an extensive area in the northern portion of the park, being especially abundant along the west side of Lamar River for about 20 miles above its junction with the Yellowstone. Here the land rises rather abruptly to a height of approximately 2,000 feet above the valley floor. It is known locally as Specimen Ridge, and forms an approach to Amethyst Mountain. There is also a small fossil forest containing a number of standing trunks near Tower Falls, and near the eastern border of the park along Lamar River in the vicinity of Cache, Calfee, and Miller Creeks, there are many more or less isolated trunks and stumps of fossil

trees, but so far as known none of these are equal to the fossil forest on the slopes of Specimen Ridge.

The fossil forests are easily reached over the wagon road from the Mammoth Hot Springs, or from the Wylies Camp at Tower Falls, and they are in their way quite as wonderful and worthy of attention as many of the other features for which the Yellowstone National Park is so justly celebrated.

Recently another extensive fossil forest has been found on the divide between the Gallatin and Yellowstone Rivers in the Gallatin Range of mountains, in Park and Gallatin Counties, Mont. This forest, which lies just outside the boundary of the Yellowstone National Park, is said to cover 35,000 acres and to contain some wonderfully well preserved upright trunks, many of them very large, equaling or perhaps even surpassing in size some of those within the limits of the park.

In the beds of the streams and gulches coming down into the Lamar River from Specimen Ridge and the fossil forests one may observe numerous pieces of fossil wood, which may be traced for a long distance down the Lamar and Yellowstone Rivers. The farther these pieces of wood have been transported downstream, the more they have been worn and rounded, until ultimately they become smooth, rounded "pebbles" of the stream bed. The pieces of wood become more numerous and fresher in appearance upstream toward the bluffs, until at the foot of the cliffs in some places there are hundreds, perhaps thousands of tons that have but recently fallen from the walls above. One traversing the valley of the Lamar River may see at many places numerous upright fossil trunks in the faces of nearly vertical walls. These trunks are not all at a particular level but occur at irregular heights; in fact, a section cut down through these 2,000 feet of beds would disclose a succession of fossil



A FOSSILIZED REDWOOD

This is one of the finest specimens in the forest. It is $26\frac{1}{2}$ feet in circumference and twelve feet high. The roots are as large as an ordinary tree, and are embedded in solid rock.

forests. That is to say, after the first forest grew and was entombed, there was a time without volcanic outburst—a period long enough to permit a second forest to grow above the first. This in turn was covered by volcanic material and preserved, to be followed again by a period of quiet, and these more or less regular alternations of volcanism and forest growth continued throughout the time the beds were in process of formation.

The area within which the fossil forests are now found was apparently in the beginning an irregular but relatively flat basin, on the floor of which after a time there grew the first forest. Then there came from some of the volcanoes, probably those to the north, an outpouring of ashes, mud flows, and other material which entirely buried the forest, but so gradually that the trees were simply submerged by the incoming material, few of them being pros-

trated. On the raised floor of the basin, after a time, the next forest came into existence, only to be in turn engulfed as the first had been, and so on through the period represented by the 2,000 feet or more of similar beds. The series of entombed forests affords a means of making at least a rough estimate of the time required for the upbuilding of what is now Specimen Ridge and its extensions.

During the time this 2,000 feet of material was being accumulated, and since then to the present day, there has been relatively little warping of the earth's crust at this point; that is, the beds were then, and still are, practically horizontal, so that the fossil forests, as they are being gradually uncovered, still stand upright.

When the volcanic activities had finally ceased, the ever-working disintegrating forces of nature began to tear and wear down this accumulated material, eroding the beds on a grand scale. Deep canyons and gulches have been trenched and vast quantities of the softer materials have been carried away by the streams and again deposited on lower levels or transported to great and unknown distances.

The fossil forest that was first brought to scientific attention is on the northern slope of Amethyst Mountain, opposite the mouth of Soda Butte Creek, about 8 miles southeast of Junction Butte. The following account, by Dr. William H. Holmes, the discoverer of these fossil forests, shows the impression first made by them:

As we ride up the trail that meanders the smooth river bottom [Lamar River] we have but to turn our attention to the cliffs on the right hand to discover a multitude of the bleached trunks of the ancient forests. In the steeper middle portion of the mountain face, rows of

upright trunks stand out on the ledges like the columns of a ruined temple. On the more gentle slopes farther down, but where it is still too steep to support vegetation, save a few pines, the petrified trunks fairly cover the surface, and



Courtesy of E. C. Alderson.

A WELL PRESERVED TRUNK

ONE OF MANY IN THE GALLATIN MOUNTAINS, MONTANA, WHERE THE FOSSILIZED FORESTS COVER 35,000 ACRES

were at first supposed by us to be shattered remains of a recent forest.

These trunks may easily be seen from the road along the Lamar River, about a mile away. They stand upright—as Holmes has said, like the pillars of some ruined temple—and a closer view shows that there is a succession of these for-

ests, one above another. In the foothills and several hundred feet above the valley there is a perpendicular wall of volcanic breccia, which in some places attains a height of nearly 100 feet. The fossil trunks may be seen in this wall in many places, all of them standing upright, in the position in which they grew. Some of these trunks, which are 2 to 4 feet in diameter and 20 to 40 feet high, are so far weathered out of the rock as to appear just ready to fall; others are only slightly exposed; niches mark the places from which others have already fallen; and the foot of the cliff is piled high with fragments of various sizes.

Above this cliff fossil trunks appear in great numbers and in regular succession. As they are all perfectly silicified, they are more resistant than the surrounding matrix and consequently stand above it. Most of them are only a few inches above the surface, but occasionally one rises as high as 5 or 6 feet. The largest trunk observed in the park is found in this locality. It is a little over 10 feet in diameter, a measurement that includes a part of the bark. It is very much broken down, especially in the interior, probably having been so disintegrated before it was fossilized. It projects about 6 feet above the surface.

In many respects the most remarkable of the fossil forests is on the northwest end of Specimen Ridge, about a mile southeast of Junction Butte and about opposite the mouth of Slough Creek. So far as known, this forest was first brought to scientific attention by Mr. E. C. Alderson, of Bozeman, Mont., and the writer, who discovered it in August, 1887. It is found on the higher part of the ridge, and covers several acres. The trees are exposed at various heights on the very steep hillsides, and one remarkable feature of the forest is that

most of them project well above the surface.

One of the largest and best preserved trees stands at the very summit of the slope. This trunk, which is that of a giant redwood, is $26\frac{1}{2}$ feet in circum-



Courtesy of E. C. Alderson.

UPRIGHT TRUNK AND "HOODOO"

The "hoodoo" consists of volcanic material in which the trees were entombed and uneven erosion has left it standing, a grotesque rock form.

ference without the bark and about 12 feet in height. The portion of this huge trunk preserved is the base, and it exhibits to a considerable degree the swelling or buttressing so well known in the living redwood. The roots, which are as large as the trunks of ordinary trees, are now embedded in solid rock.

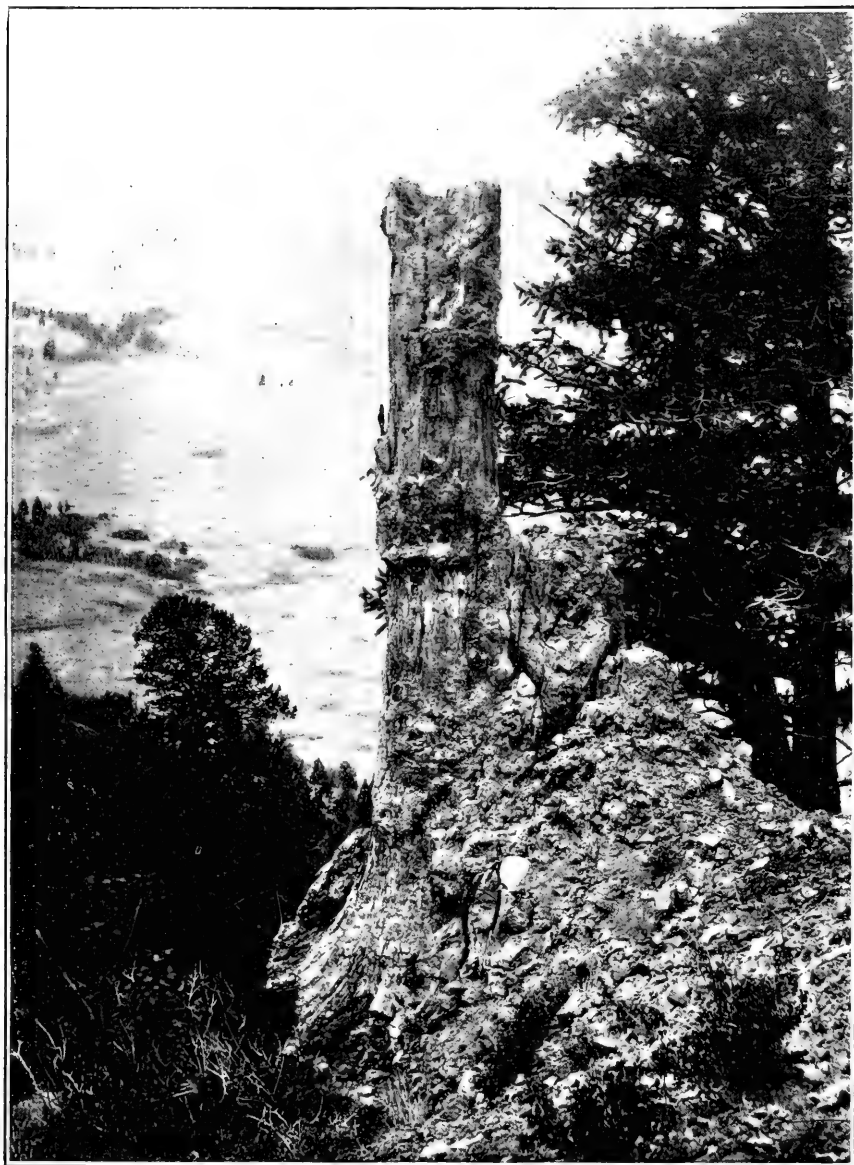


TWIN TRUNKS OF THE FOSSIL FOREST.

THESE ARE ON SPECIMEN RIDGE, YELLOWSTONE NATIONAL PARK. THEY ARE TWO FEET IN DIAMETER, TWENTY FEET APART AND TWENTY-FIVE FEET HIGH.

The height attained by the trees of this fossil forest can not be ascertained with certainty, since the tallest trunk now standing is only about 30 feet high, but every one observed is obviously broken off, and does not show even the presence of limbs. Perhaps the nearest

approach to a measure of the height is afforded by a trunk that happened to have been prostrated before fossilization. This trunk, which is 4 feet in diameter, is exposed for a length of about 40 feet, and as it shows no apparent diminution in size within this



A FOSSILIZED PINE.

The pine which grew a million years ago, now turned to stone, and near it two living pines. Note the thick bark along the trunk of this fossil tree. The tree is three feet in diameter and thirty feet high.

distance it is safe to assume that the tree could hardly have been less than 100 feet high and very probably may have been higher. This trunk is wonderfully preserved. It has broken up by splitting along the grain of the wood into great numbers of little pieces, which closely resemble pieces of "kind-

ling wood" split from a clear-grained block. In fact, at a distance of a few yards it would be impossible to distinguish this fossil "kindling wood" from that split from a living tree.

The large redwood trunk already mentioned as being nearly 10 feet in diameter may be compared with its



ANOTHER SPECIMEN SHOWING BARK.

THIS ANCIENT OF ANCIENTS IS ALSO SURROUNDED BY LIVE TREES MANY OF THEM BEING OF THE SAME SPECIES.

living relative of the Pacific coast in order to calculate its probable height. The living redwood is usually 10 to 15 feet in diameter and ranges in height from 200 to 340 feet, and as the two are so very closely related there is no reason to suppose that the fossil trunk was of less height, but by a moderate estimate it may be accredited with a minimum height of 200 feet.

The most accessible fossil forest is west of the Tower Falls Soldier Station and the Wylie camp on the road from the Grand Canyon to Mammoth Hot Springs, by way of Mount Washburn. It is on the middle slope of a hill that rises about 1,000 feet above the little valley and may be reached by an easy trail. As the traveler approaches the forest he will observe a number of



UPRIGHT AND PROSTRATE TRUNKS.

WHILE THE TALLEST TRUNK NOW STANDING IS ONLY THIRTY FEET THE PROSTRATE TRUNKS INDICATE THAT MANY OF THE TREES WERE OVER ONE HUNDRED FEET HIGH.

trunks standing upright among the stumps and trunks of living trees, and so much resembling them that a near view is necessary to convince him that they are really fossil trunks. Only two rise to a considerable height above the surface. The larger one is about 15 feet high and 13 feet in circumference; the other is a little smaller. As the roots are not exposed, it is impossible to determine the position of the part in view or the original diameter of the trees, as the bark is nowhere preserved.

Above these standing trunks lie many others, which the disintegrating forces of nature break up into small fragments and keep at about the same level as that of their surrounding matrix. Some of these trunks rise only a few inches from the surface; others are nearly covered by shifting débris. Their diameter ranges from 1 to 4 feet, and they are so perfectly preserved that the rings of growth can easily be counted. The internal structure is also in most trunks

nearly as perfect as when the trees were living.

The forest that is next in size to the one a mile southeast of Junction Butte is on Cache Creek, about 7 miles above its mouth. It is on the south bank of the creek and covers several acres. The trunks are scattered from bottom to top of the slopes through a height of probably 800 feet. Most of the trunks are upright, but only a few project more than 2 or 3 feet above the surface. The largest one observed was 6 feet in height and 4 feet in diameter. Most of these trunks appear to the naked eye to be conifers, but a number are obviously dicotyledons—that is, they were deciduous-leaved trees. The conifers, however, were the predominant element in this as in the other fossil forests.

The slopes of the Thunderer, the mountain so prominently in view from Soda Butte on the south, also bear numerous fossil trunks. Most of them are upright, but only a very few project



PROSTRATE TRUNK OF FOSSIL REDWOOD.

THIS IS ONE OF THE LARGEST OF THE FOSSIL TREES ON SPECIMEN RIDGE FOREST AND IS SO LIKE THE LIVING TREE THAT IT IS IMPOSSIBLE TO DISTINGUISH THE DIFFERENCE IN THE WOOD AT THE DISTANCE OF A FEW YARDS.

more than 2 feet above the surface. No remarkably large trunks were observed at this locality, the average diameter being perhaps less than 2 feet.

Mount Norris, which is hardly to be separated from the Thunderer, also bears a small fossil forest. The trees are of about the same size and character as those in the larger mountain. Fossil forests of greater or less extent, composed mainly of upright trunks, are exposed also on Baronett Peak, Bison Peak, Abiathar Peak, Crescent Hill, and Miller Creek. In fact, there is hardly a square mile of the area of the north-eastern portion of the park that is without its fossil forest, scattered trunks, or erratic fragments.

The vast area east of the Yellowstone Lake and the region still farther east, beyond the limits of the park, have not been thoroughly explored, but enough is known to make it certain that these areas contain more or less fossil wood. The stream beds in these areas in many

places contain fragments of fossil wood, which indicates that trunks of trees must be near at hand.

An enumeration of the kinds of trees that are represented by the woods in the fossil forests of the Yellowstone National Park is interesting. By studying thin sections under the microscope it is possible to distinguish the different kinds with reasonable accuracy and the following species have been detected:

Magnificent redwood, Alderson's pine, amethyst pine, laurel, aromatic bay, Hayden's sycamore, Knowlton's sycamore, Felix's buckthorn, Lamar oak, and Knowlton's oak.

Although only three kinds of coniferous trees have thus far been found in the fossil forests of the park, fully 95 per cent of all the trunks belong to these three species. The preponderance of conifers is probably due to the facts that they were presumably more abundant in the beginning, and that, in general, coniferous wood decays less

rapidly than that of most of deciduous-leaved trees. But the conditions were so favorable for preserving any wood that it is perhaps strange that not more trunks of deciduous-leaved trees have been found there. As it is, however, a greater number are known from the park than from any other region. Thus, the Arizona fossil forests embraced only two species of deciduous-leaved trees; the Calistoga (California) wood only one species, and the forest at Cairo, Egypt, only four species.

The 10 species of trees represented in the fossil forests of the park are by no means the only fossil plants that have been found. The fine-grained ashes and volcanic mud in which the forests were entombed contain also great numbers of impressions of plants, many of them very perfectly preserved.

The question is often asked, how old are the fossil forests? It is, of course, impossible to fix their age exactly in years, though it is easy enough to place them in the geologic time scale. The forests of the Yellowstone National Park are found in the Miocene series of

the Tertiary Period. As compared with the eons of geologic time that preceded it the Miocene is relatively very recent, though, if the various estimates of the age of the earth that have been made by geologists are anywhere near correct it



Photo by F. J. Haynes.

FOSSIL TRUNK NEAR TOWER FALLS.

may well have been a million years ago. It must be remembered, however, that this estimate involves more or less speculation based on a number of factors which may or may not have been correctly interpreted.

TREE FILLING

CHRISTOPHER CLARKE, of Northampton, Massachusetts, writing to AMERICAN FORESTRY, says:

"I notice that in various illustrations of trees that have had cement fillings to preserve their life many of the fillings have been left unpainted. As I have been interested in this special branch of

forestry work for over forty years and have made fillings of over twenty barrels of mixed cement in one filling, I have never left a filling unpainted, using paint as near the color of the bark of the trees as possible. Dark green or nearly black are the colors usually adopted and the filling is hardly noticed when thus painted.

PRACTICAL TREE SURGERY*

By J. FRANKLIN COLLINS

IT IS a well-known fact that trees are subject to all sorts of injuries, from sources too numerous to mention. In a great majority of cases these injuries are allowed to remain untreated—often for years. Rot-producing fungi commonly gain entrance at these places, and eventually the original inconspicuous or unobserved injury develops into a comparatively large area of decay. The real aim of tree surgery is to repair the damage resulting from such neglected injuries and rotted areas.

In most tree-surgery work a few fundamental principles must be observed in order that permanent good results may be realized. Remove all decayed, diseased, or injured wood and bark. When on small limbs, this can often best be done by removing the limb. On larger limbs or on the trunk it may at times mean the digging out of a cavity. (2) Sterilize all cut surfaces. (3) Waterproof all cut surfaces. (4) Leave the work in the most favorable condition for rapid healing. This will often mean the filling of deep cavities. (5) Watch the work from year to year for defects. If any appear they should be attended to immediately.

Tree surgery, or, more properly, tree repair work, is not a mysterious art known only to a favored few who alone are fitted to undertake it. It can be undertaken by any careful man who has a good general knowledge of the structure and life history of a tree, its normal manner of covering wounds, and how insects and decay organisms cause damage, provided he can handle a gouge and mallet, a saw, and a tar brush and applies in a practical manner his knowledge of the anatomy of a tree, together with a generous admixture of good common sense. For work in the tops of trees he will also need a clear head and ability to climb. Many

tree owners and many persons in charge of private estates are well qualified to undertake tree surgery if the requisite time is available and they will familiarize themselves with the fundamental principles and operations underlying the work, at least to the extent presented in this article.

PREVENTIVE MEASURES.

It is no easy matter to find a place where the well-worn phrase "prevention is better than cure" could be applied with greater appropriateness than in connection with tree surgery. Ice or wind may break limbs or uproot trees which injure others as they fall. Horses commonly gnaw away portions of the bark of street trees unprotected by tree guards. Telephone, telegraph, and electric linemen with their climbing spurs and saws are notorious mutilators of shade trees, especially in towns where the trimming of trees is not regulated by law. Poorly insulated electric wires of high voltage often discharge heavy currents through the trees. Wheel hubs frequently tear away large pieces of bark. After a few years, decay may penetrate into the interior of the tree from any or all of these injured places (Plate 1, figure 4). This decay may increase from year to year until large limbs, or the trunk itself, become so weakened that they are easily broken by violent storms (Plate 1, figure 6). It requires comparatively little time and expense to clean and paint a fresh injury. It often requires much time and expense to treat properly the same injury after it has been neglected for a few years. Almost every large decayed cavity has resulted from an injury which would have required comparatively little time and effort to clean, sterilize, and waterproof at the time it occurred.

*Extracts from a bulletin by J. Franklin Collins.

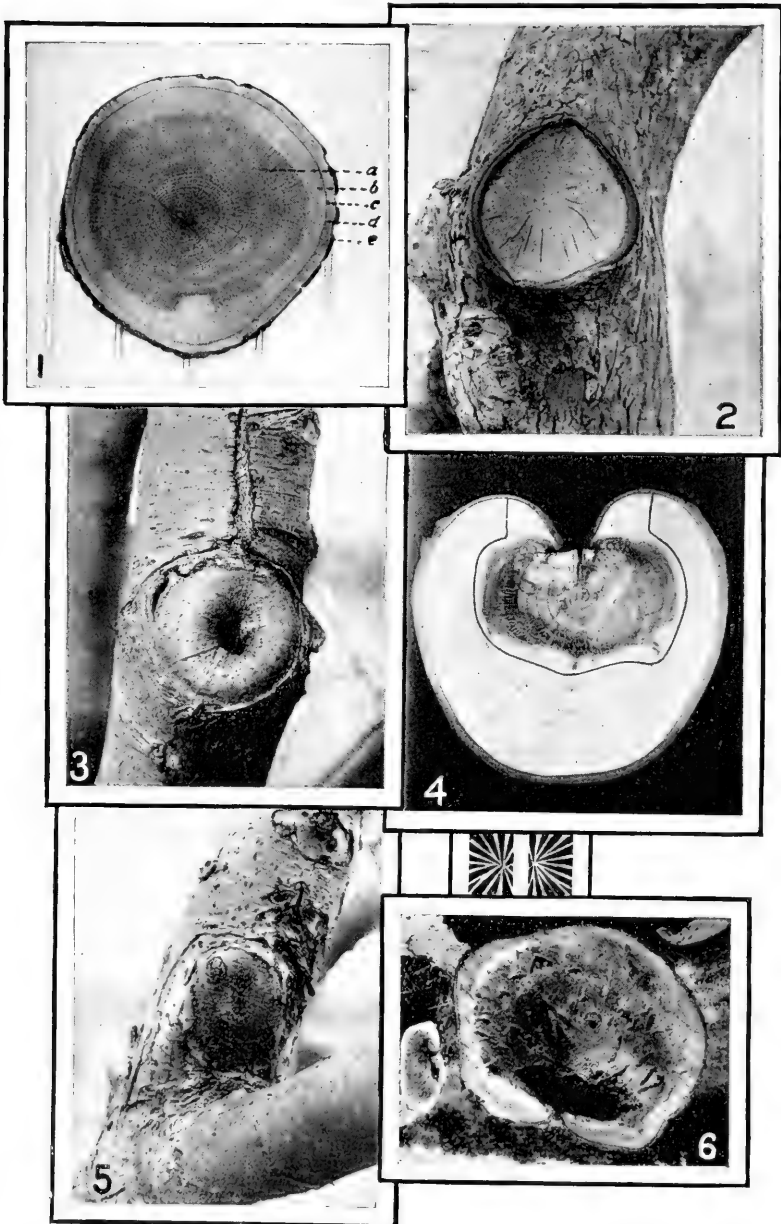


PLATE NO. 1.—PROPERLY TREATED INJURIES, SHOWING NORMAL HEALING, AND UNTREATED INJURIES, SHOWING NORMAL PROGRESS OF DECAY.

Fig. 1.—Cross section of a tree trunk showing location of parts: *a*, heartwood; *b*, sapwood; *c*, cambium; *d*, bark; *e*, corky outer bark. Fig. 2.—A scar beginning to heal over. (Note that it heals more rapidly at the sides than at the top and bottom.) Fig. 3.—A scar about three-quarters healed over. Fig. 4.—Cross section of a 7-year-old blaze on a quaking aspen which has nearly healed over. (Note the large area of decay which originated at the ax cut. The line on the wood indicates the proper shape of the cavity if this had been excavated.) Fig. 5.—A scar from a cut limb entirely healed over. Fig. 6.—End of a log, showing a small opening into the large decayed area; only a shell of sound wood remains.

The most economical and reliable remedy for a decayed area consists in attending to an injury as soon as it is made, perhaps 20 or 30 years before it becomes a menace to the tree. This fact should never be forgotten by tree owners or persons who are charged with the care of trees. If put into practice, it will insure a profit of many hundred per cent on the original outlay.

In its simplest type, tree surgery, as it is popularly understood at the present time, consists in removing dead or decayed limbs or stubs from a tree and treating the scar with an antiseptic and waterproof covering to prevent decay while healing. Another type consists in cutting out the decayed and diseased matter in trees and filling the cavities with cement or other material to facilitate the normal healing-over process. This is often referred to as "tree dentistry," a term which very aptly indicates the character of the work. Filled cavities do not increase the strength of the trunk or limb to the extent that is generally supposed.

The work on dead or diseased branches can be regarded as comprising but two essential operations: (1) Removing the branches in a manner that will prevent injury to the surrounding bark and cambium, which is the thin and usually watery layer of young tissue located between the bark and wood of all healthy parts of a tree, and (2) sterilizing and waterproofing the scars.

For the work of removing branches, the most essential implements are a good-sized saw with teeth so set as to make a wide cut, a gouge, a chisel, a mallet, and a strong knife. For cutting limbs near the ground these are the only necessary implements. For limbs situated elsewhere a ladder may be needed; also, at times, a rope.

A large limb should never be removed by sawing through from the upper side, as this usually strips the bark and wood below the scar (Plate No. 2, figure 1). The proper way is to make the first saw cut on the under side, from six inches to a foot beyond the point where the final cut is to be made (Plate No. 2, figure 2). It should reach from

one-fourth to one-half through the limb. A good time to stop cutting is when the saw becomes pinched in the cut. The second cut is made on the upper side of the limb, an inch or two beyond the first one. This is continued until the limb falls (Plate 2, figure 5). After the limb has fallen, a third cut is made close to the trunk and in line with its woody surface (Plate No. 2, figure 4). When nearly sawed through, the stub must be supported until completely severed, so as to avoid any possibility of stripping the bark below as it falls (Plate No. 2, figure 1). The first and second cuts to prevent stripping may be omitted when small limbs which can be held firmly in place until completely severed are being cut.

When the scar is not naturally pointed above and below, it is a good practice on most trees to remove a short triangular piece of bark from the upper edge of the scar and another from the lower edge (Plate No. 2, figure 3), so as to anticipate its dying back at these points. This makes the scar pointed at both ends, the most favorable shape for healing. It is important that some good shellac be applied with a suitable brush over the edge of the bark, especially the cambium, immediately after the cut is made. If the scar is a large one, it is a good plan to use the knife for one or two minutes and then shellac the freshly cut surfaces, repeating the operation until all the bark around the scar has been shellacked. The full benefit of the shellac will not be achieved if many minutes elapse between the cutting and the shellacking, unless the freshly cut surfaces are visibly moist with sap.

If necessary, the woody surface of the scar may now be smoothed off with a chisel and mallet to conform in general shape with the tree trunk. It is bad practice to leave a stub projecting from a trunk (Plate No. 2, figure 6).

DRESSING THE WOUNDS.

The final operation is to sterilize and waterproof the surface of the exposed wood and bark. For this purpose many preparations have been used. Recent extensive tests by specialists in

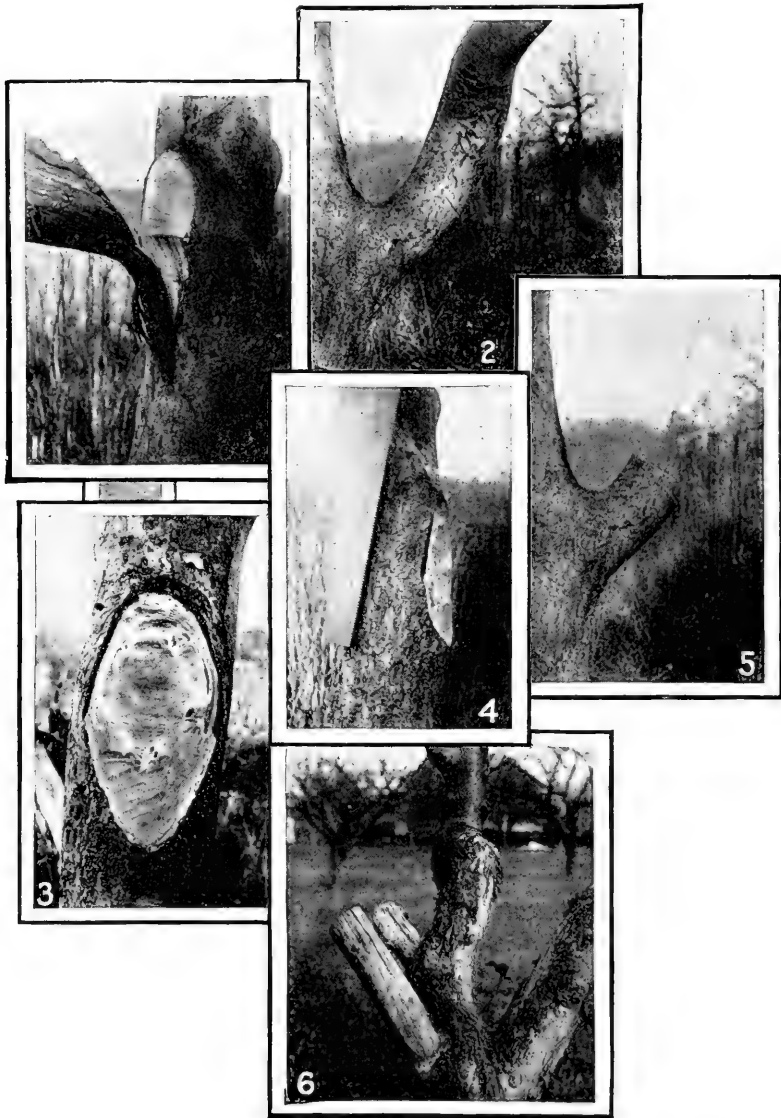


PLATE NO. 2.—REMOVAL OF LARGE LIMBS, SHOWING PROPER AND IMPROPER METHODS.

Fig. 1.—A heavy limb improperly cut, showing the stripping as the limb falls. Fig. 2.—Removing a heavy limb; the first cut on the under side is to prevent stripping. Fig. 3.—Removing a heavy limb; the oval scar has been somewhat pointed with a gouge above and below to facilitate healing. Fig. 4.—Removing a heavy limb; the third cut to remove the stub shown in fig. 5 has been completed. Fig. 5.—Removing a heavy limb; the second cut completed; the limb has fallen without any stripping. Fig. 6.—Improperly cut and untreated stubs. The bark of these stubs died mainly as a result of severing all the food-producing organs (leaves) above; decay has entered the trunk from these stubs.

timber preservation indicate that some of the creosotes stand far ahead of all other tested preparations in their power to destroy and prevent the growth of certain wood-destroying fungi and that ordinary creosote, although it does not head the list, is far better than other

preparations except some of the less known and less available creosotes. Furthermore, creosote penetrates the wood better than a watery antiseptic. In using commercial creosote, it can be applied with an ordinary paint brush over every part of the exposed wood.



No. 1.—It would be better to make these cavities oval and pointed instead of square or round.

No. 3.—Injury shown in No. 2 excavated and ready for tarring prior to filling.



No. 2.—An old injury caused by horses gnawing the bark.



PLATE NO. 3.—LONG CAVITIES EXCAVATED THROUGH SEVERAL OPENINGS AND SHORT CAVITY EXCAVATED THROUGH ONE OPENING.

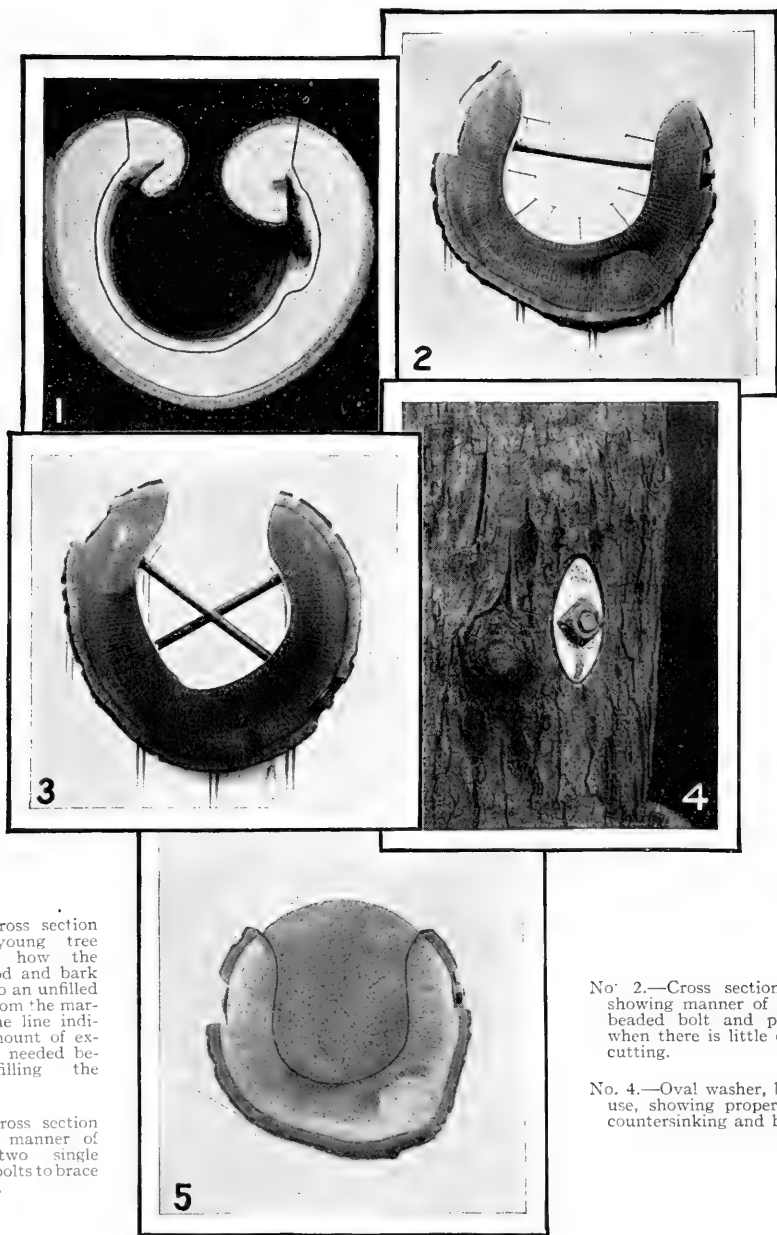
The entire shellacked and creosoted surface must finally be waterproofed by painting it with heavy coal tar. A single application of a mixture of creosote and coal tar (about one-fourth or one-third creosote) has been quite ex-

tensively used with good results. Although one coating of this mixture may at times be sufficient, it is always safer to follow it with a heavy coat of coal tar.

A good grade of lead paint can be substituted for the tar, if desired, although it is not generally considered as satisfactory; or grafting wax may serve satisfactorily for small surfaces. Asphalt and various preparations containing asphalt are excellent waterproof coverings and would doubtless be more generally used were

it not necessary to apply them hot. A good and possibly more permanent method of treating the scars is to char the surface slightly with a gasoline or alcohol blast torch and then cover the hot surface with heavy tar or hot asphalt. Although heat is an excellent sterilizing agent, it does not penetrate so well as creosote and it kills back the cambium to a greater extent.

Permanent waterproofing can be secured only when the treated surfaces are watched from year to year and recoated when any tendency to crack or peel is observed. This is an important step, which is almost invariably neglected by tree owners and tree surgeons.



No. 1.—Cross section of a young tree showing how the new wood and bark grow into an unfilled cavity from the margin. The line indicates amount of excavating needed before filling the cavity.

No. 3.—Cross section showing manner of using two single beaded bolts to brace a cavity.

No. 2.—Cross section of cavity showing manner of using single beaded bolt and placing nails when there is little or no under cutting.

No. 4.—Oval washer, best kind to use, showing proper method of countersinking and bolting.

No. 5.—SAME AS NO. 2 FILLED WITH CEMENT.

PLATE NO. 4.—VIEWS OF EXCAVATED, BOLTED AND CEMENTED CAVITIES.

TREATMENT OF CAVITIES.

During the last few years there has been a widespread popular interest in the treatment of decayed places in old trees. This type of work can be regarded as comprising three essential operations: (1) Removing all decayed

and diseased matter, (2) sterilizing and waterproofing all cut surfaces, and (3) filling the cavity in a manner that will favor rapid healing and exclude rot-producing organisms.

The necessary tools for digging out decayed matter are few. As a rule, two

outside-ground socket-handled gouges (one with a curved cutting edge of about three-fourths of an inch and the other, perhaps, one and one-half inches), a chisel, a mallet, a knife, and an oilstone are sufficient for ordinary work. The gouges, chisel, and knife should never be used near the cambium when they lack a keen edge, as dull tools will injure it. In cutting out deep cavities, longer interchangeable handles for the gouges may be necessary.

EXCAVATING.

Usually an old decayed spot may be partially or wholly covered by a new growth of wood and bark at the edges and the visible decayed area be small as compared with that which is hidden (Plate No. 1, figures 4 and 6). In such cases it is usually necessary to enlarge the opening with the gouges and mallet in order to make sufficient room in which to use the gouges in the interior. This opening should be sufficiently long to reach all the decayed and diseased heartwood with little or no additional injury to the tree.

If the decayed and diseased wood extends some distance above or below the external opening, it is a common practice to cut one or more holes above or below the main opening in order to facilitate the removal of the diseased wood (Plate No. 3, figure 1). This results in one or more bridges of wood and bark spanning the long interior cavity. This practice is of doubtful value, partly because it is often impossible to see whether the diseased wood has been entirely removed from the under side of the bridges, but mainly because there is a strong tendency in most trees for the bark and sapwood of the bridges to die and decay as a result of severing the sap-conducting tubes both above and below. If the holes are pointed above and below, there is less trouble from this source. A practice that permits a more thorough cleaning out of the cavity is to make a narrow opening, pointed at both ends and sufficiently long to include all the diseased wood. This often extends some distance above and below the visible discolored area.

The most important feature of this stage of the work is to remove all the diseased and insect-eaten wood (Plate No. 3, figures 2 and 3). This excavating must continue on all sides of the cavity until sound, uninfected wood is reached (Plate No. 1, figure 4). All discolored or water-soaked heartwood should be removed, as this is the region in which the rot-producing fungus is most active. In decayed areas of many years' standing there may be only a thin shell of uninfected wood around the cavity (Plate No. 1, figure 6), in which case there is danger of the tree being broken by storms unless braced or guyed.

The bottom and all other parts of the cavity should be so shaped that if water were thrown into the cavity it would promptly run out and none remain in any hollow.

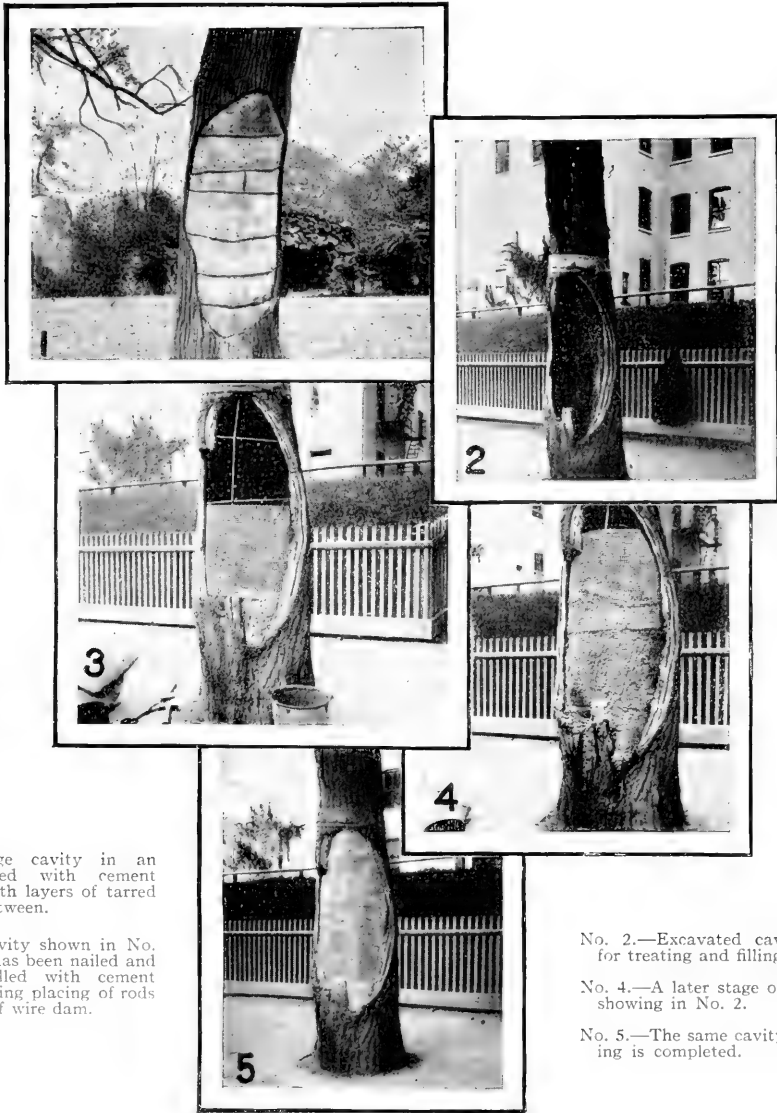
UNDERCUTTING.

Another important point to be borne in mind in shaping a cavity that is to be filled is to have the sides undercut if possible, so as to hold the filling firmly in place. Care must be taken, however, not to have the wood at the edges of the opening very thin, as this promotes the drying out of the bark and sapwood at these points. Ordinarily the edges should be at least three-fourths of an inch thick; an inch and a half would be better (Plate No. 1, figure 4 and Plate No. 4, figure 1).

Great care must be exercised in working around the cambium, and all cutting tools must be kept very sharp. The final cutting along the edges of the bark and sapwood can usually best be made with a very sharp knife. This cutting must be followed immediately by a coating of shellac, which should cover the edges of both bark and sapwood.

BOLTING.

Before cementing a long cavity it is advisable to place through it one or more bolts, so as to hold the wood and cement more firmly in place. A cavity two feet or less in length will not usually require a bolt, but long cavities, as a general rule, should be bolted every



No. 1.—Large cavity in an Elm filled with cement blocks with layers of tarred paper between.

No. 3.—Cavity shown in No. 2 which has been nailed and partly filled with cement and showing placing of rods and use of wire dam.

No. 2.—Excavated cavity ready for treating and filling.

No. 4.—A later stage of the work showing in No. 2.

No. 5.—The same cavity after filling is completed.

PLATE No. 5.—CEMENT CAVITY FILLINGS, SHOWING DIFFERENT TYPES AND SUCCESSIVE STAGES.

18 to 24 inches. Oftentimes a single bolt can be placed so as to support both sides (Plate No. 4, figure 2). In certain cavities it may be necessary to place bolts at different angles (Plate No. 4, figure 3). In any case a strip of uninjured cambium at least an inch wide should be left between the edge of the cavity and the bolt. On medium-sized trunks, after deciding where the bolts can most efficiently be placed, a very sharp half-inch bit, sufficiently long to reach through the trunk and

cavity, can be used to bore the hole for the bolt. On large, heavy trunks a larger bit should be used. Heavy oval or round iron or steel washers, about three times the diameter of the bolt, should be countersunk into the wood by carefully cutting away the bark at both ends of the hole with a sharp gouge or chisel (Plate No. 4, figures 2, 3 and 4).

All split cavities must be securely bolted, particularly near the upper part. If the split comes from a crotch, all

decayed and diseased wood should be removed from the split and creosote and tar applied, after which it can be bolted just beneath the crotch, so as to close the crack or at least bring the parts back to their normal position in case decayed matter has been excavated from the crack. If the split is a recent one, a washing of creosote only will usually be sufficient before drawing the sides together with bolts. Under certain conditions, particularly in large trees, it may be necessary to use a rope and tackle blocks to pull the limbs together some distance above the crotch, in order to properly close the crack before bolting it.

If the cavity has a comparatively large opening or has little or no undercutting, it is the custom to drive flat-headed wire nails into the wood in the interior in order to hold the cement filling firmly in place. In medium-sized cavities nails two and a half or three inches long are usually driven into the wood for about half their length (Plate No. 4, figure 2).

TREATING.

After the decayed and diseased matter has been completely excavated and the edges of the sapwood and bark shellacked, the next step is to sterilize the interior of the cavity in order that all germs of disease or decay which are present may be killed and that any which may come in contact with the cut surfaces during subsequent operations may be destroyed. As already stated, creosote appears to be one of the best preparations to use. Every cut part of the wood and bark must be creosoted, and over this a heavy coating of tar or hot asphalt should be applied before the cavity is filled.

MIXING THE CEMENT.

A good grade of Portland cement and clean, sharp sand free from loam (1 part of cement to 3 or less of sand) should be used. A quantity of dry cement and sand sufficient to fill the cavity should be thoroughly mixed before the requisite amount of water to make a rather stiff mortar is added and the whole mixture worked to an even

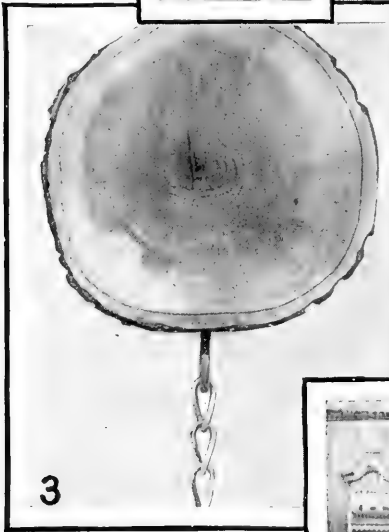
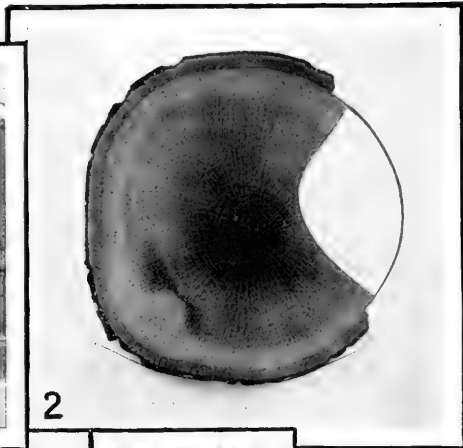
consistency. In large cavities fine gravel free from loam is sometimes substituted for the sand.

CEMENTING.

For placing the mixture in the cavity a mason's flat trowel and an ordinary garden trowel with a curved blade will be found convenient. A tamping stick, 1 or 2 inches thick and 1 to 3 feet long, according to the size of the cavity, will be needed; also some rocks and a pail of water if the cavity is a large one. A layer of cement 2 or 3 inches deep can now be placed in the bottom of the cavity with the garden trowel and tamped firmly in place. This operation is repeated until the cement is 8 to 12 inches thick. Wet rocks of various sizes may be embedded in the cement provided they do not reach within an inch or two of its outer face. If the mixture is too wet, it will tend to run out of the cavity under the operation of tamping. If too little water has been used, it will not pack down promptly. The top of the 8 to 12-inch block of cement is then smoothed with the flat trowel so that it will slant slightly downward from back to front, in order to facilitate drainage. Over the top of this cement block a double or single sheet of tarred roofing (or thinner) paper is placed after it has been cut so as to fit the cavity. On top of this, another block of cement is built as soon as the first block is sufficiently hard to stand the weight and tamping without forcing any of it out at the bottom of the cavity. If the interior of the cavity extends well above the level of the external opening, it may occasionally be necessary to bore or cut a downward slanting hole from the outside to the top of the interior cavity, through which a watery mixture of cement may be poured to fill the upper part of the cavity and the hole. The main opening of the cavity must be completely closed with the stiffer cement before this watery mixture is introduced. When a block of the cement has partially hardened, it will be necessary to carefully smooth the outer surface or cut it down with the flat trowel to the level of the cambium, taking great care that the lat-

No. 1.—Cement filling shattered by cold weather and swaying of the tree.

No. 2.—Cross section showing method of covering cavity with sheet metal.



No. 4.—A long cavity with nails and cement reinforcing rods in place ready for filling. This cavity should have been bolted.



No. 5.—An open shallow cavity ready for creosote and tar. Shallow cavities of this type are not usually filled with cement.

No. 3.—Section of tree trunk showing simple method of attaching a guy chain to a hook bolt.

PLATE NO. 6.—A DAMAGED CEMENT FILLING, TYPES OF UNCEMENTED CAVITIES, AND CROSS SECTION SHOWING METHOD OF ATTACHING A GUY CHAIN.

ter is not injured in the operation (Plate No. 4, figure 5 and plate No. 5, figure 1). If the cement is allowed to become too hard to trim with the trowel, it can still, with more or less difficulty, be cut back to the cambium line with a cold chisel and hammer. It is a rule with most tree surgeons to trim back the outer surface of the cement to an eighth of

an inch or more below the cambium and then use a layer of stronger cement (one part of cement to one or two of sand) to raise it to the level of the cambium, after the filling has partially hardened.

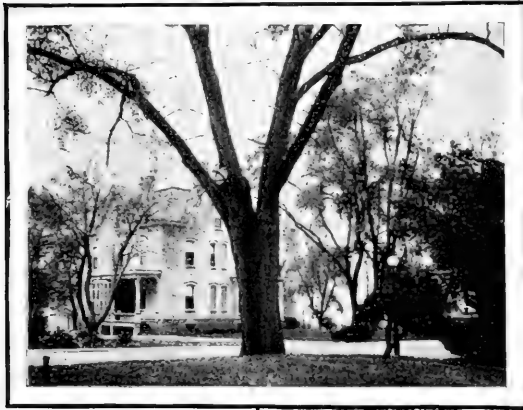
The thinner mixtures of cement will set more firmly. If any mixtures thinner than the one already mentioned are

used to fill a cavity, some sort of cloth or wire dam will have to be used to hold the cement in place until it is hard. For this purpose strips of burlap wrapped tightly around the tree so as to cover the lower part of the opening may be sufficient if the mixture is not very thin; otherwise, a more closely woven fabric, such as canvas or carpet, may be used.

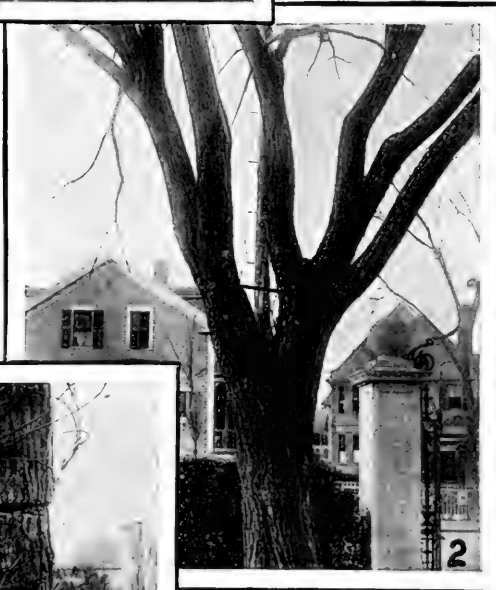
After the cement filling has become thoroughly dry, the outer face may be painted with coal tar or paint, especially around the edges where cracks are likely to appear. This should not be done for several weeks after the cement has been put into the cavity.

TINNED CAVITIES.

Sheet tin, zinc, and iron have been quite extensively used to cover cavities. When properly applied, these coverings often serve to keep out disease and insects for a long time. Oftentimes they are improperly applied, or the cavity is not properly treated. Under such conditions these tin-covered cavities are a greater menace to the tree than open cavities. In preparing a cavity for a sheet-metal covering, all the decayed, diseased and insect-eaten wood is removed in the manner indicated



No. 1.—Limbs of an Elm tree guyed by several independent chains 15 feet above the crotches. PLATE NO. 7.



No. 2.—A split crotch guyed by means of a long bolt about eighteen inches above the crotch.



No. 3.—A tupelo tree nearly strangled by telegraph wires wrapped around the trunk.

under cement fillings, with two exceptions: There is no need of undercutting the cavity and there should be a narrow half-inch ledge of wood around the edge of the cavity to which the margin of the sheet metal can be tacked. The excavated cavity must be thoroughly

sterilized and waterproofed. The sheet metal should be trimmed so that its edges will exactly fit along the edges of the bark. The metal can then be placed on a block of wood and holes an inch or less apart punched or drilled along its margin, through which long, slender, flat-headed brads may be driven into the ledge of wood around the cavity. The edges of the cavity and the inner side of the metal should now be freshly tarred. The metal is then put in place and nailed with a light hammer, allowing the center of the metal to curve outward, so as to conform to the general shape of the trunk (Plate No. 6, figure 2).

In a tree which is not considered of sufficient value to warrant cleaning and filling the decayed areas or covering them with tin, these may be excavated, sterilized, and waterproofed (Plate No. 6, figure 5). In this condition they can often be safely left for years if the waterproof covering is renewed as soon as cracks or blisters appear.

THE TIME FOR SURGERY.

As a general rule, tree surgery can be safely undertaken at almost any time of the year when the sap is not running too actively and the weather is not cold enough to freeze the cement. In most trees the sap will interfere with the work only from the time the buds begin to expand in the spring until the

leaves are full grown. Cement work will be ruined if it is frozen before it is hard. It is not likely to be injured by frost after it has been drying for a week.

TREES WORTH REPAIRING.

Most ornamental and shade trees having only a few dead limbs are unquestionably worth attention. Others which have many dead limbs or numerous decayed areas may not be worth the expense, particularly if they are naturally rapid-growing, short-lived trees. No one can decide better than the owner of a tree whether it is worth the attempt to save it, because usually the actual commercial value of an ornamental or shade tree has little or nothing to do with the decision. It is generally a question merely of esthetic value, or historic associations, or rarity of the species. A man who has had experience in repairing mutilated or diseased trees may be able to say definitely whether it is possible to save the tree, but the owner, who pays the bill, is the one who will have to decide whether the tree is worth the price it will take to repair it. Often the owner will realize a greater degree of satisfaction by having a badly diseased or mutilated tree replaced. In expert hands the moving of large trees is no longer a hazardous undertaking.

STUDYING THE LUMBER INDUSTRY

WORK has been commenced by the Forest Service and the Department of Commerce in the scientific study of the lumber industry for the purpose of developing the economic facts concerning the industry and placing them before the public in a fair and impartial manner. The lumber manufacturers have very generally signified their willingness to cooperate in furnishing the representatives of the departments

named the information which will aid them in this work.

Chief Forester Graves, of the Forest Service, indicates the fair and open-minded basis on which this study is to be conducted in saying:

"It is my purpose to set the facts ascertained before the public, necessarily from the point of view of the interests of the people at large, but with absolute impartiality and fairness to the industry. I propose to make the

inquiry not only impartial but constructive and helpful in dealing with the problems of the industry as far as I am able to do so. I shall want to obtain the judgment of members of the industry on the conclusions indicated by the study before they are put in final form."

As the report to be eventually issued will deal with the costs of lumber production, the effect of taxation upon timber cutting, the possible utilization of material now wasted, and other practical phases of lumbering operations, it is obvious that a comprehensive study, based upon such facts, will be of as much benefit to the lumber industry itself as to the public in general.

The Forest Service announces the following assignments of its men in connection with this work:

F. H. Smith and R. S. Simmons, now engaged in a study of foreign markets, are carried on the rolls of the Bureau of Foreign and Domestic Commerce. E. S. Bryant and R. S. Bryant, carried on the rolls of the Forest Service, are

investigating the conditions controlling lumber production in the southern yellow pine region. Austin Cary, with the assistance of members of District 6, is conducting a similar investigation in the Pacific Northwest. C. Stowell Smith, with the assistance of the officers in District 5, is conducting an investigation of conditions controlling lumber production in California. F. A. Silcox, with the assistance of the members of District 1, is conducting a similar investigation in the Inland Empire.

The Forest Products Laboratory, under the direction of Howard F. Weiss, is supplementing these investigations by studies of utilization and waste.

The Office of Industrial Investigation, under the direction of O. T. Swan, is conducting studies of the adaptation of manufacturing and grading to wood using industries and markets.

Other members of the Forest Service within the next two months will undertake studies of special phases of lumber distribution.

WEST VIRGINIA FIRE PROTECTION

THE Executive Committee of the Central West Virginia Fire Protective Association has arranged to cooperate with the State and Federal Government in preventing and controlling forest fires and has appointed several patrolmen.

This association, which was organized several months ago for the purpose of supplementing the State and Government in forest fire work, is composed of all the principal timber land owners in central and southeastern West Virginia, the largest of whom are the Cherry River Boom & Lumber Company, with 210,000 acres, the Gauley Land Association with 175,000 acres, the West Virginia Pulp & Paper Company with 150,000 acres. Other members are the Babcock Lumber Company, George Craig & Sons; Bemis Lumber Company; Raine-Andrews Lumber Company; Wildell Lumber Company; Wilson Lumber Company, Gilfilin, Neal & Company; Pocahontas Land

& Development Company; Denmar Lumber Company, Gladys Fork Lumber Company, Porterwood Lumber Company and William's Heirs.

All this land belonging to the Association, comprising more than 800,000 acres, is assessed annually at 1 cent per acre, which will be used in cooperating with the State and Government in better protecting these forest lands from fire.

The State builds and equips lookout stations on high mountain peaks, the Government furnishes lookout watchmen for these stations and the private owners, through this Association, furnish patrolmen, which makes a complete system as is now being used in the following sixteen states: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Maryland, Kentucky, Michigan, Wisconsin, Idaho, Minnesota, Washington, Oregon and South Dakota.



A FIRE PLACE FOR THE WOODS.

THIS IS MADE OF STONES AND IS ONE OF A VARIETY OF FIRE-PLACES ADVOCATED BY CAREFUL WOODSMEN.

A SAFE CAMP FIRE-PLACE

THERE are almost as many ways to start a camp fire as there are campers. Many prefer what is known as the "tepee" or "wigwam" style, in which a pyramid is built with fine twigs on which are superimposed others that are progressively larger until they are full size. Others use on either side of a fire-place two green sticks as supports, and "lay" the fire as with andirons.

But whatever the method of starting there is only one way that is safe, as far as prevention of forest fires is concerned. Such a safe fire is never built against a fallen log or near a tree. The ground is carefully cleared of inflammable duff and rubbish. The picture represented herewith shows the right kind of a place for a camp fire in the woods. The large flat rocks at the sides will support coffee pots or cooking utensils; and the built-up back will serve to reflect heat if the fire is built for warmth or good cheer.

This fire-place puts such definite limits on the blaze, that when the time

comes for quitting camp, a little water and some shovelfuls of mineral soil will effectually extinguish the blaze and prevent the spread of fire to the woods.

A fire-place of this type can be more elaborate and pretentious, of course, but its essential features of safety and convenience can not be much improved.

Such a fire-place is available for use from one camping party to another. Before being used, however, all the accumulated debris should be carefully cleared away.

Stones are in no way essential. On the Florida National Forest, for example, where the soil is a fine sand, one camper asserted that the largest stone he found was in a can of baked beans. In such a place a hole scraped in the sand, with the pine needles and debris raked away, makes an adequate and safe fire-place. Similar conditions elsewhere can be satisfactorily met by making a hollow in the earth; then when the fire is left it can be effectually extinguished by heaping upon it the earth removed from the excavation.

A WHITE MOUNTAIN PURCHASE

GREATLY to the delight of New Englanders who have for some years advocated the purchase by the Government of areas in the White Mountains which include points of particular scenic value and interest, the National Forest Reservation Commission during September approved the purchase of 85,000 acres of White Mountain forest lands which include Mt. Washington, Mt. Adams and Mt. Jefferson. These mountains, famous for their rugged beauty and very popular as health and summer resorts, furnish what is regarded as the keystone or hub of the White Mountain drainage system and the members of the commission feel that the purchase is one of the most important that has been made.

For the past three years there have been almost constant negotiations for these lands and at times New Englanders, who advocated the purchase and were very anxious to have the Government take them over before more timber was cut by private owners, felt that the commission was not giving the matter the attention it deserved. Consequently they are elated by the successful outcome of the negotiations.

The lands approved for purchase include two principal tracts: The first comprises three State grants known as the Thompson and Meserve purchase, Sargent purchase, and Hadley purchase, making in all 33,970 acres; the second tract includes portions of the towns of Albany and Bartlett, amounting to 45,170 acres. The two tracts belonged to the same company and were purchased at \$8.50 an acre.

The bulk of these lands were first offered to the Government three years ago at a price of \$28.60 an acre. The Forest Service, which is charged with the examination of such lands, held that the price was too high, and de-

clined to recommend the purchase, in spite of the fact that a large amount of public sentiment had developed in its favor. Within the past year a very careful estimate was made of the standing timber on both tracts, and as a result of this estimate the Forest Service was finally able to secure the offer of the land at a price which was felt to justify its purchase.

Portions of the land contain very dense and valuable stands of timber. That in what is known as the Great Gulf, lying on the north side of Mt. Washington, between that mountain and Mts. Jefferson and Adams, consists of an unusually heavy stand of spruce. This area is prominently in view from all the surrounding mountains and it has been constantly brought to the attention of the commission that a large part of the public desired that the land might pass into the hands of the Government. Altogether, these two tracts contain about seventy million feet of spruce and fir timber, in addition to considerable quantities of hardwoods, mainly beech, birch, and maple.

Another tract in which the public was deeply interested is a body of land of 5,600 acres situated on the south slope of Mt. Passaconaway and on the east slope of Mt. Whiteface. This tract lies immediately above the village of Wonolancet, a favorite New England summering place, and also contains a valuable body of timber. On this tract there are 800 acres of virgin spruce, containing about 15,000 feet to the acre. This again is one of the virgin tracts which public opinion has strongly favored the Government's owning.

Two other tracts of smaller size make up the purchase. Altogether they bring the Government purchase in the White Mountains up to 220,000 acres, or nearly one-third of the region covered by this mountain system.



GENERAL VIEW OF MT. WASHINGTON AND MT. JEFFERSON.

THESE TWO MOUNTAINS ARE INCLUDED IN THE PURCHASE RECENTLY APPROVED BY THE NATIONAL FOREST RESERVATION COMMISSION. MT. BOWMAN VALLEY IS IN THE FOREGROUND.

WHAT IS A NATIONAL FOREST?

By T. W. VENEMANN.

SO MUCH discussion and comment has been published in recent years relative to federal control and administration of the National Forests that there are comparatively few people in the United States today who do not have some knowledge, at least, of the existence, location, and purposes of these forests. While it is pretty generally understood that they are large bodies of mountainous, timbered lands controlled by the government for the purpose of protecting and preserving the resources of the forests, there are many persons who have but a very vague idea of what constitutes a National Forest, or, in other words, what is its physical make up and appearance.

Probably the general impression held by many who have never seen or had any business dealings on them is, that they are immense bodies of heavy timber stretching for miles and miles along

the mountain slopes, for the most part uninhabitable and undeveloped. This impression although erroneous is quite natural for the reason that the name National Forest itself implies large bodies of timber, while in the general presentation of forestry topics they are usually referred to collectively, or as individual forest units. It would be surprising to many, then, to know how much similarity actually exists between the developments on the National Forests and those in other parts of the states in which they are located.

If the reader will examine a map of Colorado, he will notice that, although the entire western half of the state is traversed by heavy mountain ranges, towns and settlements are as thickly scattered throughout this section as on the more open and level portions of the state. This fact is significant for the reason that these same mountains are also occupied by fourteen and a half



PLACER MINING.

THIS OPERATION IS NEAR HABINS PEAK ON THE ROUTT NATIONAL FOREST IN COLORADO AND SHOWS HOW SECTIONS OF NATIONAL FORESTS ARE USED AS MINING CLAIMS.

million acres of National Forests, proving at the outset that these forested areas are not huge bodies of uninhabitable and undeveloped timberlands. While it is true that some of them contain large stands of dense and inaccessible timber, other portions are more thinly wooded, on which the timber is held primarily for the protection of the water supply without which the surrounding country would be uninhabitable. The greatest development is found within these more sparsely

one of the largest and most important of which is the Pike. This Forest alone occupies a gross area of 1,323,000 acres, on the eastern slope of the Rocky Mountains, and practically in the center of the state. Primarily the Pike is what is known to foresters as a protection forest. That is, the forest cover is held mainly for the protection and conservation of the water supply furnished by countless streams originating within the Forest. How much is dependent upon the protection of this for-



CASCADE CANON AND RAMONA HOTEL.

A SUMMER RESORT ON PATENTED LANDS WITHIN THE PIKE NATIONAL FOREST IN COLORADO.

wooded regions. Many of these developments existed long before the forests were set aside and, of course, were excluded from the actual Forest boundaries. When the Forests were created they were made to include only unappropriated public lands and, at the same time, to exclude as far as practicable, any considerable bodies of land having a greater value for other than forestry purposes. These factors are largely responsible for the irregular shape of their outer boundaries. This same broken-up condition also exists within the Forests as will be seen later.

In Colorado there are seventeen separate and distinct National Forests,

est cover may be realized when it is known that such municipalities as Denver, Colorado Springs, Cripple Creek, Idaho Springs, Golden, Central City, Georgetown, Boulder, and scores of other smaller settlements on and adjacent to the Pike are almost wholly dependent, for their domestic water supplies, upon streams arising in or flowing through this Forest. Not only is this true as regards domestic water supplies, but hundreds of thousands of acres of agricultural lands within and without the forest boundaries are irrigated through the same sources.

It is impossible to tell in a single article all of the developments on the



DEVIL'S HEAD FIRE LOOKOUT STATION.

ON THIS HIGH, BOLD ROCKY PEAK A FOREST FIRE PATROL IS ABLE TO WATCH OVER MANY MILES OF FOREST AND TO QUICKLY DISCOVER ANY FIRE WITHIN RANGE OF HIS TELESCOPE.

Pike Forest. For instance the southeastern wing of this Forest and adjacent territory, involves a total area of 1,260 square miles, or thirty-five townships.

Near the upper edge are Cheeseman Lake and Dam, which together with the South Platte River, form the most important factors in the water supply system of Denver. Near the base are Pikes Peak and the municipalities, Colorado Springs, Colorado City, Manitou, and Cripple Creek, dependent upon its watershed. Three of the nine railroads crossing the Pike Forest are in this section, together with the famous "cog road" running between Manitou and the summit of Pikes Peak. One of these is the Colorado Springs and Cripple Creek route, considered among the finest and most popular scenic mountain trips in America. A few miles west of Colorado Springs and crossing a portion of the Forest is the wonderful "High Line Drive," an automobile thoroughfare built along the crest of the mountains and revealing to the tourist a magnificent view of mountains and plains for miles

around. In addition to these routes of travel there is the Ute Pass road, forming part of the state and transcontinental highway between Colorado Springs and Leadville, built by convict labor, together with the elaborate system of roads and trails crossing the Forest in all directions.

Included in the Pikes Peak region, within and adjoining the Forest, are many of the most wonderful nature freaks in the Rocky Mountains. The Garden of the Gods, Glen Eyrie, with its reproduction of the Cliff Dwelling, the historic Ute Pass, Cheyenne Canyons, Cave of the Winds, Seven Falls, Crystal Park, Mount Manitou incline railway, and scores of other scenic attractions drawing thousands of tourists from all parts of the country to that section. It is estimated that fully half a million sightseers visit this portion of the Pike Forest every summer.

Following the lines of railroad are numerous towns and settlements, while scattered throughout the Forest are hundreds of summer and year-long residences, stores, hotels, schools, and

other improvements for the convenience of tourists and permanent residents.

Near Clyde is the Rathke elk preserve, leased from the government for the protection of a band of these rapidly diminishing animals. The Colorado Springs Fly Casting Club has its fishing resort on Beaver Creek, a few miles west of Palmer Lake. At Palmer Lake, adjoining the eastern border of the Forest, and dependent upon the Forest for many of its recreative features, is one of the most attractive

gations are being conducted by the Forest Service to determine how best to reproduce, develop, and manage the forests of the Rocky Mountain region.

In order to facilitate the transaction of business the Pike is divided into eleven ranger districts, each provided with a ranger headquarters. Where such headquarters are not more conveniently located in nearby business centers, they are established on the Forest, consisting of dwellings, barns, outbuildings, pastures, and a small



A NATIONAL FOREST OPERATION.

A LUMBERING SCENE ON THE PIKE NATIONAL FOREST IN COLORADO.

mountain resorts in the state. Nestled in the timber on the slope of the mountain are many beautiful summer cottages readily seen from the cars of the two railroads passing close by. On the eastern border of the Forest, near Monument, the Forest Service maintains one of the largest forest nurseries in the country, supplying annually hundreds of thousands of young trees for restocking denuded areas within the National Forests. Two miles west of Manitou, on the slopes of Pikes Peak, is situated the Fremont Experiment Station, where extensive forest investi-

gations are being conducted by the Forest Service to determine how best to reproduce, develop, and manage the forests of the Rocky Mountain region.

The most destructive agency on the National Forests today is fire, which annually destroys millions of dollars worth of public property. In order to reduce this loss to a minimum the Forest Service during the last ten years has built up on the Forests a vast network of roads, trails, and telephone lines, established fire lookout stations on prominent mountain peaks, and placed throughout the Forests thousands of tool caches containing fire-

fighting equipment. Probably the most unique fire lookout station in existence is located on the summit of Devil's Head, a rocky peak lifting its head ten thousand feet above sea level. From this pinnacle the lookout man, stationed there during the summer months, commands a view of three-fourths of the entire Forest, or more than a million acres of valuable timber. Located on the very summit is a telephone, while at the base of the huge rocks that crown the mountain a camp is established for the lookout. A small cabin is also built on the summit of the peak to house the telephone and to shelter the lookout in case of storm. On the topmost rock, with a sheer fall of one thousand feet on three sides, a table containing a map of the Forest is bolted into the solid granite, by the aid of which the fire lookout is able to locate any fires arising on that portion of the forest within view of the station. He can then communicate by telephone with the office of the Forest Supervisor at Denver, thirty miles distant in an air line. This, itself, is a remarkable illustration of how modern developments may be

found in supposedly inaccessible regions.

All land within the boundaries of the National Forests is not government land. In order to explain the broken up condition within the Forests take for instance a single township in the Pike National Forest, a portion of the township is alienated from the Pike Forest and comprises state and private lands following the line of the Colorado and Midland Railroad, many of which were purchased from the government before the creation of the Forest. Those that were not so purchased are for the most part patented homesteads.

This is typical of the condition existing to greater or less extent throughout all of the National Forests. Hundreds of streams flowing through the Forest are studded on either side with agricultural homesteads; in countless small draws and ravines, in open parks, and in fact wherever lands are capable of producing crops and are more valuable for that than for forestry purposes, they are open to homestead entry. These alienations apply not only



A FOREST HOMESTEAD.

THE RESIDENCE, BARNS AND OTHER BUILDINGS OF A PROSPEROUS HOMESTEADER ON A NATIONAL FOREST.

to agricultural but to mineral lands as well. Thousands of patented and unpatented mineral claims are located throughout the National Forests. At Nederland, Colorado, on the Pike, are located the largest tungsten mines in the world, while also on this Forest, near Central City, are the only mines producing pure uranium in the country.

The most important enterprises on the National Forests, producing a revenue to the government, are the grazing and timber sale industries. Scattered throughout the Forests are thousands of acres of open park and non-timbered lands having no value for agricultural crops, on which the Forest Service annually feeds millions of head of livestock, the products of which go to supply the demands for meat, hides, and wool in every state in the Union.

Next in importance to the protection of the forest cover, it is the object of the Forest Service to dispose of its

mature and dead timber through scientific forestry methods, thereby accelerating the young growth and increasing the productive capacity of the Forests. Located on the National Forests, therefore, are hundreds of sawmills, wood pulp and other wood using industries, annually consuming millions of feet of timber.

It may readily be seen from these few illustrations that development is not lacking on the National Forests nor does it differ materially from that outside the Forest boundaries. The fullest development both within and without the Forests is actively sought by the government for the mutual benefit and protection of the resources of the entire region. The forest timber, its water, minerals, game, and every other resource is available for use by the general public, and the government is endeavoring to make them an everlasting heritage.

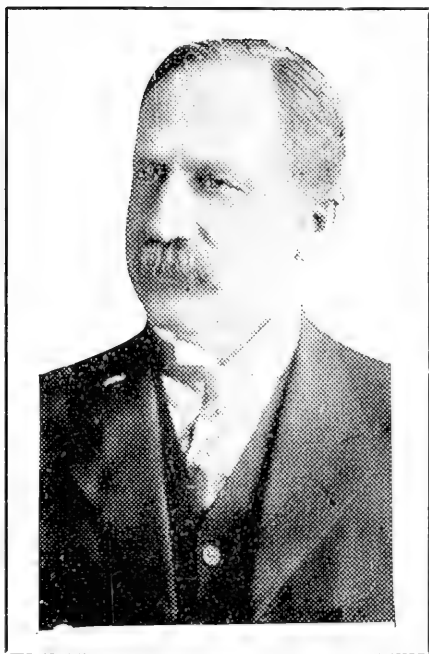
BERKS COUNTY CONSERVATION

BERKS COUNTY, PA., has set the pace for all other counties of that State and every other State, in the organization of a county conservation association, which was effected on September 12. A number of foresighted men, realizing the necessity of preserving the scenic beauty as well as the natural resources of the county, started the movement which is to enlist the aid of all the residents and is certain to do a great deal of good. The association will devote its work to the preservation of the forested lands of the county in public parks and on public and private lands, to forest fire prevention, placing the smallest practicable tax on timberlands, conserving the water supply, protecting wild life in forest and stream, and inspiring a love of natural scenery. Among the features of the proposed work will be the saving of Mt. Penn and Neversink which



THE PAGODA.

On Mt. Penn, Pennsylvania, where the Berks County Conservation Association was organized September 12.



JONATHON MOULD.
PRESIDENT BERKS COUNTY CONSERVATION
ASSOCIATION.

overlook the city of Reading, and which have been marred by the lumberman and the quarryman.

The organization was effected at an enthusiastic meeting at The Pagoda on Mt. Penn, recently turned over to the city by its owner, Mr. Jonathon Mould. There gathered, as a result of excellent preliminary arrangements by the several men who started the movement, a large number of men and women eager to aid in the good work. Mr. Mould presided and addresses on forestry and general conservation were made by Dr. Henry S. Drinker, president of Lehigh University and president of the American Forestry Association; Dr. J. T. Rothrock, vice-president American Forestry Association; Hon. S. B. Elliott, Forestry Commission of Pennsylvania; Irvin C. Williams, Deputy Commissioner of Forestry; A. B. Farquhar, president Pennsylvania Conservation Association; John Birkinbine, president Pennsylvania Forestry Association; Joseph Kalbfus, secretary Pennsylvania



SOLAN L. PARKES.
EXECUTIVE SECRETARY BERKS COUNTY CON-
SERVATION ASSOCIATION.

Game Commission; George W. Kehr, secretary Pennsylvania Conservation Association; Mayor Ira W. Sutton, of Reading; B. Frank Ruth, park superintendent, of Reading; Daniel K. Hoch,



JOHN K. STAUFFER.
Editor "The Forester" 1899-1900, Wash-
ington newspaper correspondent, 1900-
1914. Now member and secretary of
Reading City Planning Commission and
chairman Advisory Committee of Berks
County Conservation Association.



DANIEL K. HOCH.

TREASURER BERKS COUNTY CONSERVATION
ASSOCIATION.

WM. H. LUDEN.

ADVISORY BOARD MEMBER BERKS COUNTY
CONSERVATION ASSOCIATION.

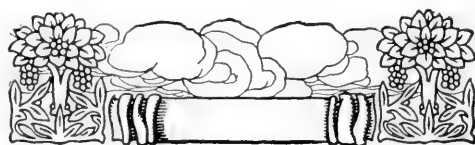
county controller; John Keim Stauffer, secretary of the Reading City Planning Commission, and others.

The officers elected were Jonathon Mould, president; Solan L. Parkes, executive secretary; Daniel K. Hoch, treasurer; Hon. Ira W. Stratton, first vice-president. The burgesses of the boroughs of Berks County were all made vice-presidents. Headquarters are to be opened shortly and an aggressive conservation campaign started.

An interesting feature of the gathering was the fact that John K. Stauffer, chairman of the advisory committee and one of the most active of the promoters of the association, was a number of years ago editor and publisher of AMERICAN FORESTRY and has ever since maintained his deep interest in forestry. As indicating this he has secured the

title to a large section of forested land on Mt. Penn overlooking Reading and he will make out of it a model forest, conducted by scientific foresters, and designated for the use of the people of Berks County. This will not only preserve the natural beauty of that side of Mt. Penn but be an object lesson in forest preservation which should set an example for other owners of forested land in that section of the State. Members of the Conservation Association are elated over Mr. Stauffer's decision.

In Mr. Jonathon Mould the association possesses a president who, having retired from active business, will devote much of his energy to the work and in Solan L. Parkes he will find a most energetic and hard-working assistant. The success of the association appears to be already assured.





JUNIOR CLASS PHILIPPINE FOREST SCHOOL.

THE CLASS OF 1915 IS COMPOSED OF 13 HIGH SCHOOL GRADUATES, 3 FOURTH-YEAR STUDENTS, 4 THIRD-YEAR STUDENTS WHILE THE 1916 CLASS JUST ENTERING THE FOREST SCHOOL HAS 169 HIGH SCHOOL GRADUATES, 2 FOURTH-YEAR STUDENTS, AND 4 THIRD-YEAR STUDENTS.

FILIPINO FORESTERS

GRATIFYING progress is being made in instructing Filipinos in forestry at the forestry school established by the Bureau of Forestry at Manila, under the direction of Major George P. Ahearn, and particularly good results are expected of the junior class, which recently returned from its summer camp on Mt. Maquiling, where much practical work was done and considerable valuable information of forest conditions secured.

General Inspector J. R. Barber, in reporting to Major Ahearn about the camp, says:

"The members of the faculty connected with the camping scheme are to be congratulated upon its success. From what I observed, I believe the students were distinctly benefited by the experience obtained. The permanent camp, two rather inadequate snapshots of which are attached, was excellently located on the northern side of Mt. Maquiling about 16 or 17 kilometers from the Forest School. Absolutely all work

in and about the camp such as cooking, washing dishes, cleaning up, gathering rewood, etc., was performed by the students.

"During the period of the encampment the students received practical instruction in all branches of the field work which is conducted by the bureau. In accordance with your expressed wish the undersigned gave particular attention to the manner in which the students conducted themselves with reference to cooking, packing, camping and their general adaptability to field life. I was very well pleased, indeed, with what I found. They were cheerful, happy and willing during the hike, even though it was decidedly uncomfortable for them on two occasions, when heavy rains were encountered. Each student carried all of his own equipment, including bedding roll and mosquito bar as may be seen by the third attached snapshot. I believe each and every student in the class to be quite capable of looking out for him-

self satisfactorily in the field. They are on the whole a pretty husky bunch of boys and I am inclined to the opinion that they are the best material, as a class, we have yet had at the school, and good results may confidently be expected from them upon their graduation and taking up active service in the Bureau."

Major Ahearn, in writing to AMERICAN FORESTRY about the school and its success, says:

"The forest school was started early in 1910 as part of the College of Agriculture, University of the Philippines. The college and school are situated near Los Baños at the base of Mount Maquiling, some 42 miles from Manila, being connected with the same by excellent rail and water transportation. This section of the country is building up fast as is evidenced by three recently constructed railroad lines now girding the mountain. Mount Maquiling is 3,800 feet in elevation and, being almost wholly forested, was set aside as a reserve as soon as the school was established. The area of the reserve approximates 15,000 acres. The study and mapping of this reserve, together with constructive work such as road and trail building, tree planting, etc., is part of the work of the students, and in addition each class is expected to improve one hectare (two and a half acres) of the reserve, making a sort of a model forest on a small scale which will be left as a monument to the class doing the work.

"The students are given a practical training, namely, to estimate roughly the character, extent and value of a given area, to locate and build trails, keep licensees up to the rules, apprehend and prosecute trespassers and become acquainted with the land status of each occupant within the forest zone. The training in wood technology and forest botany is exceptionally thorough,

as it must be in order to be of practical use, for in the average small district under a ranger will be found many hundreds of tree species, the woods of which in some cases grade into each other almost imperceptibly. We now have in the Philippine herbarium specimens of more than 2,500 tree species. During their course the students are made more or less familiar with the operations of the large lumber companies, and are also encouraged to visit the various woodworking industries in and about Manila.

"The cottages used by the students and the faculty are built by the Bureau; the grounds are prettily parked and kept in perfect order; military discipline is the rule and includes daily inspection of houses and grounds.

"The rough outdoor work of the boys keeps them in fine physical trim, so that when they leave for their stations at graduation they present a far more robust appearance than when they entered two years before. They have their societies, including a musical club, and also help to run a magazine, thus fully taking up their time. The headquarters of the model forest district (No. 5) is at the school, and this brings the students into frequent contact with live questions of administration and investigation.

"Opportunity is given the graduates, who are also high school graduates, to return to the school for the course leading to the degree of Bachelor of Science in Forestry. Students are selected from all over the Islands and upon graduation are sent to provinces other than their own. After four years' service they will return to their home provinces, where they can do good missionary work in arousing public sentiment in favor of forest conservation, for without the active cooperation of the public at large, forest laws and regulations are of no avail."



FORESTS, LUMBER AND CONSUMER

By E. T. ALLEN

Forester for Western Forestry and Conservation Association

THE business of supplying us with the products of the forest is one of our three or four greatest American industries. It is our greatest manufacturing industry. Consequently all others are largely dependent upon it. It employs more men, supports more families, than any other manufacture. Lumber is made by labor and its cost is in pay-rolls, returning to the consumer, whatever his vocation. Government statistics show that in my own great lumbering region, the Pacific northwest, 85 per cent of the price the mills receive have already gone to the community in costs. It probably surpasses every other industry of importance in smallness of profit. In individual cases, unusual opportunity has built large fortunes, but for every one of these are many cases where the public has profited by failure. Also there have been temporary or local situations where one branch of the industry has profited at the expense of another. But on the whole lumber does not cost the consumer as much more than the actual cost of producing it as do most other commodities. Few, if any, things are sold at so much less than their intrinsic value as the trees of which lumber is made. It is essentially a business of service; not one of middleman exploitation, or of fabricating luxuries, or of parasitism in any form. And we, a wood-using and wood-selling nation, depend upon it almost as much as upon food itself.

I wish to emphasize that we cannot consider forestry intelligently until we realize that it is not forests at all, but forest industry, that we seek to perpetuate. The community has little to gain from forests unless it encourages and helps to a sound permanent footing the activities which make them useful and worth preserving. And, conversely,

unless it does this, it is not likely to guide or force these activities along lines which do preserve forests. What would be their object? Forests, lumbering and community; community, lumbering and forests—the sequence is inseparable, whether it reads forward or backward, and inseparably it underlies forestry and every forestry problem.

Twenty years ago we had practically nothing, now we have an efficient national forestry administration. Many States have forest laws, some have good ones, a few are fairly liberal with funds. We have forestry associations and congresses. Lumbermen are taking the lead in fire prevention, for in less than ten years the systematic protection of private timber has grown from practically nothing to cover about 100,000,000 acres, with an increase of 3000 per cent in the last five years. But the Forest Service has to fight for existence in every Congress. Many States still have no forest legislation and few legislation that is adequate. In many sections lumberman and public are so mutually suspicious that neither supports any real solution of their common problems. In short, who can claim that there is any recognized American forest policy, existing not because reformers have prevailed on some occasions but because a majority of our population understands what is needed and why, and has insisted upon putting it into effect?

All this is because we have never seen forestry in its practical aspects as we do agriculture, for example. Our average citizen knows when in his town or vicinity, where community relations are so clearly under his eye that they are familiar and clear to him, any industry employs a large part of the population, produces the chief manufactured product, and pays an impor-

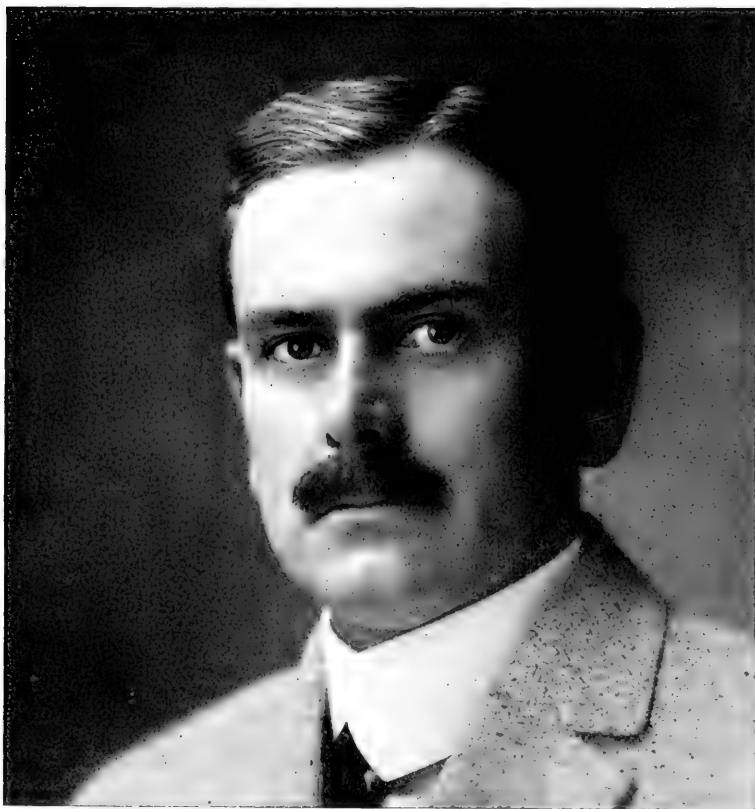
tant part of the taxes. Let us say it is dairying, or fruit growing, or furniture making. He concedes its necessity without argument. Citizens and officials alike work for its continuance and development. None would dare do otherwise. If it needs regulation for public good, they do this also. But they know how. If it is a dairy community, its average citizen knows pretty well what production costs, what prices are fair, what improvements are feasible, what the State can and should do to aid or regulate, what public demands are reasonable.

The relation of forests and their management to State and Nation is exactly that of our illustrative industry to our suppositious vicinity, and so is their relation to every citizen. The trouble is that we cannot see it so clearly. The very immensity of the industry causes its several processes of growing, manufacturing and distributing to be conducted separately and thus confuse the public mind. How can we expect our average citizen to see all this when we talk only about forests? We might as well talk only of land when trying to improve agricultural conditions, or water when urging the protection and propagation of food fishes. It is the entire business of their production and use that he must understand; its place in the society under which he exists, the economic laws under which it exists. He must regard it just as he does the production and use of any other necessary crop, obviously to be stabilized on a permanent basis profitable to all concerned. He must realize that its performances and service to the community—supplying the consumer, employing labor, using supplies, and paying taxes—require, like any other industry, three essential conditions: perpetuation of the resource dealt with, economy in every process, and just return for the service rendered. And, whether he is a private citizen or a law maker, to do intelligently his part in formulating an American policy under which such conditions are assured, he must be fairly familiar with the factors which govern lumber prices, logging and manufacturing

methods, and the cost of growing and protecting the raw material.

Why is there little trouble in getting laws or appropriations for the advancement of agriculture or horticulture? Not because these industries or their participants are more useful and deserving, but because people understand their governing factors and see the point of such laws. Were forest economics equally understood, a State with a hundred times more revenue to be expected from lumber than from wool would not appropriate \$20,000 for coyote scalps and only \$500 for forest protection. A community that applauds its chamber of commerce for getting a shoe factory and gives it a free building site would not carelessly burn up a forest capable of employing a thousand times as many men and then tax the owner so he cannot hold and protect the land for a new crop. A State glad to see its farmers get a good price for wheat, even if it does use flour, would not rejoice because its sawmills are forced to sell lumber below cost. A lumberman who prefers to let his trees stand until Americans need them, rather than cut at a loss for foreign export, would not be accused of conspiracy to bleed the consumer any more than is a farmer who does not raise potatoes when they don't pay for raising.

Now a word as to the lumberman himself. The private owner controls most of our forest area. His use of it, our use of it, and the effect of our relations upon our joint use of it, largely determine our forest destinies. Why, if his interest and ours is in the main identical as I have said, does he ever regard forestry as antagonistic or do we incline to regard him as its object of attack rather than as part of it? Is it not just because forestry is too generally made a creed, not a business, and because we have not shown ourselves competent to deal with its business aspects? However gladly we might welcome the improvement of our own various industries and professions, would we be likely to seek it through regulation by lumbermen knowing as little of our trade as we do of theirs?



E. T. ALLEN, FORESTER OF THE WESTERN FORESTRY AND CONSERVATION ASSOCIATION AND PACIFIC COAST REPRESENTATIVE OF THE AMERICAN FORESTRY ASSOCIATION.

Nothing can be more inconsistent, so long as most of our forests are privately owned, and even our public forests must be privately manufactured for us, than to antagonize the lumberman whose help we must have by continuing such ignorance of his problems that we even treat him as an enemy.

Let us, then, see if we can make a brief glance at our tangled forest situation disclose a few points where practical attacks may lead to its eventual clearing up.

We now cut perhaps 50 billion feet of lumber a year for consumption and export, besides billions of lath and shingles, millions of ties and cords of wood, and enormous quantities of poles, mine timbers, cooperage stock, distillate material and other products measured by standards difficult of popular grasp. I hardly know how to put the vastness of this quantity before you in

any comprehensible comparison. It would load a train of cars reaching once and a half around the earth at the equator. It would pave a roadway from the earth to the moon, two inches thick and over 30 feet wide. We are cutting each year three times the yearly growth, to say nothing of the loss from fire.

To meet this, we have perhaps 2500 billion feet of standing timber suitable for lumber. We can only guess as to future cutting rate, or loss by fire, or areas which will be permitted to reforest, but 50 years is commonly given as the approximate life of our visible supply. Over half this supply is on the Pacific Coast, less than quarter is in the South, the Lake region has $3\frac{1}{2}$ per cent, and the remaining fifth is scattered outside these three main forest regions. And of the entire supply, less than two-fifths is in various forms

of public ownership, State and Federal, and over three-fifths is in private hands.

There is, however, a vast area of cut and burned-over land, increasing yearly and useless for any other purpose, which might be growing a new crop. On the Pacific Coast alone, which has been called the nation's woodlot because of its combination of favorable climate and rapid-growing species, there are fully 20 million acres of such deforested land which if encouraged to do so should yield 500 billion feet in 60 years. And in the same region the 120 million acres or more of uncut timber, if restocked as cut, would eventually produce as much as we now consume. Adding obtainable reproduction elsewhere in the United States, there is no sound reason why we should not be well provided in perpetuity. The chief thing to fear is that these new crops will not be started soon enough.

Obviously what we want is such inducements as shall effect the use of all this land, cut and uncut, regardless of ownership, with the least waste of existing material, the most certain production of future material, and the lowest prices to consumer for which such supply of his needs can be assured. Older countries have learned the futility of expecting this without sincere community support and the removal of prohibitory conditions. Having accorded these, they are in position to require the industry to reciprocate. It would reciprocate even more gladly here, for it has more involved. Our attitude, however, is either of complete indifference or that forestry is to be spread by the sword, with occasional defensive fortresses of public forests. Even these many of us regard less as business institutions than as points from which to shout defiance and expect reprisal. Surely we also should be intelligent enough to evolve a policy which considers both private and public forestry in their joint relations and from the viewpoint of permanent industrial development. If so, what are the conditions to be met?

Whatever may have been conditions in the past; when timberland was cheap, market near at hand, and carrying costs

negligible; great financial opportunity in standing timber no longer exists. Taxes, protection cost and interest on the investment are now compounding far more rapidly than prices can be advanced. Apparently home consumption cannot use all our vast stored supply until carrying costs have exceeded what the material is worth to the consumer. Realization of this is making the tendency sharply toward competitive overproduction, not toward monopolistic holding back of material. Unfortunately, however, this does not benefit the consumer. The mill accepts less, but the ultimate retailer does not sell for less. Differences are absorbed enroute. The producer always gets the least that he can possibly take and the consumer pays the most he can possibly pay. The net result of low mill prices to the consumer is wasteful cutting and forced foreign export, to hasten the day when his question will be not what he must pay for a board but whether he can get a board at all.

Insofar as this situation of the lumberman is due to his own overinvestment, we may not sympathize with him. It is hard for us to say whether he hoped for an unearned increment or thought he was prudently supplying his mills. But it is discouraging to good permanent management and we will suffer with him accordingly. And we are certainly equally short-sighted when we aggravate it more intolerably by continually threatening the timber with a carelessness with fire which has no parallel in the civilized world and by a confiscatory taxation system which has been abandoned by every nation that pretends to a forest policy. Our tax system forces destruction, prohibits conservation, and pays us less than would a rational one.

WHERE IS WASTE?

We talk much of the appalling waste of our forests when cut. The truth is that every portion of the tree that can be taken out of the woods without loss is taken out, and more, for to some extent the higher grades can be made to pay for the loss on lower grades. The reason for this waste is the same

reason for the waste of poorer apples or potatoes which the farmer knows will not pay for hauling—except that when a community wastes food it probably expects enough next year, whereas when it refuses to pay for full utilization of lumber it deliberately shortens its future supply. Lumbermen have been trying for years to save by manufacturing odd lengths, but are about discouraged because the consumer, accustomed to standard lengths, still insists on buying a 16-foot board and cutting it in two himself instead of taking two 8-foot ones. It is also known to all lumbermen and foresters that waste in the woods is almost in exact proportion to the falling off of lumber prices. Instead of cutting less when lumber is low, the operator must cut more in order to get the higher quality which alone can be taken out at any profit, leaving the rest to rot or burn.

Finally, after wisely creating vast national forests to safeguard our future against the shortage all these things portend, we now hear in Congress a demand that their timber be forced on an already demoralized market, so that for a little revenue in the national treasury today we may force further waste and foreign export of our total supply and have less when we really need it later.

THE NEW SUPPLY.

So much for our stored mature supply. With the growing of new supply it is even worse, for there is less excuse and no salvage. Try to imagine the vast areas that ax has denuded usefully and fire uselessly, lying desolate and as dead a loss as though engulfed by the sea, which might be earning us millions yearly, a source of growing tax revenue, supplying our forest needs, employing labor, supporting industries, protecting streams, sheltering game. Now a menace and a burden, it might contribute to every citizen.

Do you not suppose the owner would prefer to make this land valuable? Now that free virgin supplies are gone, and the cost of carrying mature timber

for his future operations is so excessive, the lumberman sees the life of his industry dependent on a new crop. Even if selfish, his interest is as keen as ours. But however optimistically he calculates the probable growth, or the price likely to be obtained, he faces the probability that we will burn his investment up and the practical certainty that taxes will eat all profit before the harvest. We refuse to do what other countries do—let him pay the tax when the crop demonstrates wealth that ought to be taxed and affords revenue with which to pay. We ask him to carry a risky investment for fifty years, with interest to pay and no returns, and also to pay annual taxes which with compounding interest will bring his entire cost beyond what we could ever afford to pay him for the crop even if he has the funds in advance to finance such a remarkable project.

After this review of our policy to encourage good management of private forests, old and new, let us see if we would apply it to an agricultural resource. Burn up part of it; waste the rest cheerfully; devise a tax to punish keeping it till we need it, so as to hasten disposal abroad; forego a larger tax we might collect by less waste; by no means pay enough to encourage the producer to improve his methods; threaten him with cutrate competition, of we can catch him at particular disadvantage, with resources of our own that we can ill spare for such a purpose; and finally, if he considers trying again with a new crop, promise to prevent this by confiscatory taxation. Now is this our real desire regarding forests? Certainly not. It is only the accidental result of never having taken the trouble to study the foundations of one of our greatest industries. But it is what the rest of the world regards as American forestry. I have had Japanese foresters ask me to explain it. Definitions again. We do have forest schools, forestry associations, state and national foresters, and even women's forestry clubs. But do we know what it is all about?

Let us turn to state and national forestry. We have a national forest system, with nearly 200 million acres under its control—a tremendous empire in itself. You understand that the service charged with its management is competent and loyal. Surely, you say, here at least we are in the van of progress.

Here is a stupendous task, involving the protection of existing forests, restocking denuded areas, and disposing of the product so as best to serve the entire nation. To withhold funds necessary to this work is letting an immensely profitable plant lie idle, as well as in danger of destruction, to save the cost of fuel and watchmen. To mismanage it is worse, for this one-fifth proportion of our national supply cannot but influence the four-fifths under other control upon which we are even more dependent.

Yet even here we are without a national policy. The Forest Service can neither announce nor execute such a policy as long as there is extreme variance in the views, not only of the States, whose attitude toward their own forests and forest industries has a profound influence, but also in Congress where any executive policy, to be dependable, must find sanction and support. European countries, Japan, even China, seek farseeing and expert determination of the principles involved, but every session of our Congress sees the whole subject debated from a dozen viewpoints, chiefly political, seldom statesmanlike, and always without real knowledge of forest economics. Instead of setting an example, we spend less per acre for care of our forests not only than other governments but than our own private owners upon contiguous lands. Retrenchment which does not extend to the "pork barrel" is practiced vigorously when dealing with protection of the lives and resources of the people. Pressure for the sale of timber to a sacrificial and demoralizing extent is brought through penny-wise

ignorance or to "grandstand" against a mythical lumber trust for political purposes.

Now all this is not chiefly the fault of politicians. There is nothing for them except so far as it can be made to strike a responsive chord in their constituents. With the public half so well informed on the production of the lumber it needs as it is upon the getting of its parcels by mail or the price of sugar there would be an expression on an American forest policy that would leave no statesman uncertain. We cannot blame him if there is no such expression. We don't know ourselves, that is all.

The same is true of our States. Few have comprehensive far-seeing policies, covering their own opportunities on State-owned forest lands and adequate encouragement of good private management. Yet here, of all places, it is the commonwealth that determines. It is State intelligence and State pride that dictates to the representative in Congress and, in its own laws and their enforcement, makes forestry a real instrument for good instead of a grudging concession to reformers. And State intelligence will not be exerted until we stop making forestry an abstract problem of public or private conscience. Abstract ethics do not get results like fear of personal injury or hope of personal gain. It is futile to discuss the needs of posterity and present sacrifice as a duty. The average citizen must come to see that bad forest management, in this country of ours, means a handicap of industry, harder conditions of life, not only for his children but for him as well. Whenever an acre of forest is destroyed by fire, forced into wasteful use, or not grown where it might be grown, he bears most of the loss.

Nor is this enough. Though he recognizes the evil, it will not be remedied until he knows its practical working reasons, so he may concede when he must and demand where he may; not create further confusion through sentiment, ignorance, or prejudice.

* From an address at the midsummer meeting of the Board of Directors of the American Forestry Association at Chautauqua, N. Y.



A GROUP OF ALASKAN SCHOOL CHILDREN.

CONSERVING NATIVE ALASKANS

ALASKA has an area approximately equal to one-fifth of the United States and in this continental region there are about 25,000 natives in villages ranging from 30 to 40 up to 300 or 400 persons, scattered at intervals along its thousands of miles of coast line and on its great rivers.

During eight months of the year all of the villages in Alaska, with the exception of those on the southern coast, are reached only by trails over the snow-covered land or frozen rivers. Many of the native villages are remote from the main lines of travel, with no established means of access. In spite of the inherent difficulties of the problem, the Bureau of Education has established a United States public school in each of 70 villages, with 97 teachers, each of whom is a "settlement" worker striving to elevate the natives, adults as well as children, intellectually, morally and physically.

In many of the villages the public school is the only agency striving for the uplift of the natives. Each school house is a social center for the accomplishment of practical ends. Many of the buildings contain, in addition to the recitation room, an industrial room, kitchen, quarters of the teacher, and a laundry and baths for the use of the native community. The schoolroom is available for public meetings for discussion of affairs of the villages or, occasionally, for social purposes.

In the native villages the teachers and nurses endeavor to establish proper sanitary conditions by inspecting the houses, by insisting upon proper disposal of garbage, and by giving instruction in sanitary methods of living. Natives are encouraged to replace their filthy huts by neat, well-ventilated houses. In some sections the natives have been taught to raise vegetables,

which are a healthful addition to their usual diet of fish and meat.

There are extensive regions in which the services of a physician are not obtainable. Accordingly, it often becomes the duty of a teacher to treat minor ailments, to render first aid to the injured, or to care for a patient through the course of a serious illness.

The Bureau of Education fosters the establishment of co-operative stores and other co-operative enterprises owned and managed by the natives themselves. By thus relieving themselves of the burden of the profit exacted by the middlemen, the natives are able to secure the necessities of life at the lowest prices and can at their own local stores obtain equitable value for their furs, ivory, woven baskets, and other native products.

The 70 school buildings are valued at \$247,411, and the school equipment and furniture at \$65,000. The appropriation for education is \$200,000 a year, of which \$36,000 is used for medical relief of the natives. The school enrollment is approximately 4,000. About 1,500 native children in remote villages are still to be provided with school facilities.

MEDICAL WORK.

There is no specific appropriation for the support of medical work among the natives of Alaska. For several years the Bureau of Education has been striving, without success, to secure funds for use in making proper and adequate provision for the checking and prevention of the diseases which, beyond question, prevail to an alarming extent among the native races of Alaska. It has succeeded in securing a modification of the terms of the appropriation for education of natives of Alaska which enables it to employ physicians and nurses. It cannot erect the

hospitals which are so greatly needed.

Realizing the absolute necessity for action, the Bureau of Education is using \$36,000 of the \$200,000 appropriated for the education of natives in employing nine physicians, nine nurses, in supplying the teachers with medical chests for use in treating minor ailments of the natives, also in maintaining three improvised hospitals in school buildings in centers of native population where hospitals are most urgently needed, and in making contracts with four hospitals for the treatment of diseased natives.

Nearly 1,800 cases were treated in the hospitals at Juneau, Nushagak, Nulato, and Kotzebue during 1912-1913. The most prevalent diseases were tuberculosis, trachoma, rheumatism and venereal diseases; the surgical operations included excisions for tubercular diseases of the bones, the removal of tubercular glands, laparotomies, curetting of ulcers, setting broken bones, sewing up recent wounds, and excisions of hemorrhoids, cataracts, abscesses, tonsils, and adenoids. During the year epidemics of infantile paralysis at St. Michael and of diphtheria at Nulato were checked by physicians employed by the Bureau of Education.

Referring to the medical work of the Bureau of Education in Alaska, Dr. Emil Krulish, Passed Assistant Surgeon, United States Public Health Service, detailed to investigate health conditions among the natives of Alaska, makes the following statement in his official report:

"This improvement in the Sitka village, which is an example of the improvement in other sections of Alaska, I attribute chiefly to the influence and efforts of physicians, nurses, teachers, and hospitals now under the Bureau of Education. It demonstrates the fact that the outlook for the general improvement of the native is encouraging and the task is feasible."



BOYS MAKE BIRD HOUSES

BIRD houses that are not only an artistic addition to any estate but are a positive enticement to birds, and an inspiration for bird lovers, are now being made by the boys of Allendale Farm. They are suitable for all the birds which one might desire as friends and neighbors in either city or country, and when they are erected in the proper environment they are not long unoccupied. The making of these houses is a labor of love for the Allendale boys, because on their beautiful, well kept farm at Lake Villa, Illinois, they quickly become nature lovers and acquire a knowledge of the value of birds and the joy of their cheering companionship which many another boy might envy.

The bird houses are sold and an attractive little circular tells what they are and how much they cost, as well as showing sketches of the different models, and it is worth noting that lovers of birds have become purchasers of many of these dainty little structures.

There are the Martin houses which should be, we are told, placed on a clean pole sixteen or eighteen feet from the ground, in the sunlight away from the shade of the trees, and there is added the note, with the comfort of the birds in mind, that the closed side of the houses should face the north so that the birds may be protected from the cold north winds. These houses cost from three to twenty-five dollars.

Then there are the houses for the dainty little wrens. These houses should be placed not more than eight or ten feet from the ground and may be located close to a residence. They should face east; there will be no danger of the wren oversleeping himself with the early morning light shining full in his little doorway, and the wrens like these houses best when they are in close to a bush or a tree. These houses cost only a dollar and a quarter, for they are small and simple. There is also the blue-bird house and this costs the same as the residence of the wren. It may be

hooked to a tree or placed upon a twelve foot pole in the open or among the fruit trees.

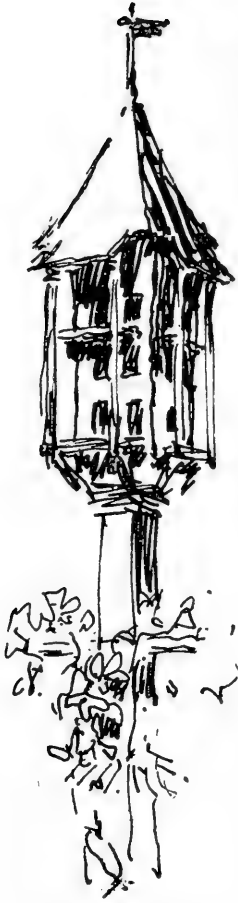
The Allendale boys also make attractive food shelters, a box-shaped affair with open sides and a sloping roof. These are mounted on stumps, the food



AN ALLENDALE BOY WITH A BIRD HOUSE HE HAS MADE.

is placed on the floor and the roof protects it from the weather. These food shelters are speedily discovered by the birds and if the right kind of food is placed in them the birds flock to them and soon make their homes in the vicinity. There is also a robin shelf which is another type of food shelter and artistic as are the others.

Now, Allendale is a colony or farm for homeless and neglected boys where they are protected, reared and educated. It is supported by voluntary contributions and the boys are sent there by men and women who are interested in the Association, the official name of



A MARTIN HOUSE.
Lawrence Buck Model with
16 Rooms.

which is the Allendale Association of Chicago. The farm is at Lake Villa, Ill. It comprises 120 acres of good farm land. The boys take care of this and it is a model farm. In addition to caring for the farm they make excellent progress in their studies and, as the bird houses indicate, are clever at various handicrafts. There are five cottages, each with a mother and a family of twelve to sixteen. Each family takes care of its own house, has its own possessions and separate rooms for its members, its fireplace and books and such trophies as boys collect and cherish. The meals are cooked in a central kitchen and distributed to the various families

who have their own table and dine together. There is an admirable school with able teachers, a laundry where the boys help the laundress, the big kitchen with the boys as assistant cooks, a manual training and repair shop well equipped; gymnasium and drill hall for winter sports, and in fact all things that are essential to the physical, mental and spiritual training of the boys.

The making of the bird houses was an outgrowth of the boys nature study and coupled with it is the boys aid in the nation wide movement for bird protection. The boys in their spring tramps learned to recognize and distinguish the early migrating birds as they returned week by week and a careful record was kept and the name

of each classified bird was credited to the observer, while the teachers aided by frequent talks on the habits of birds. On Arbor and Bird Day last May Audubon buttons were awarded to boys who knew ten or more birds, and one boy established a record by naming forty-five birds.

Out of this study developed the decision to manufacture and sell bird houses, and as the carpenter shop is well equipped and the boys have special training in the use of tools the work soon became not only financially successful but a positive delight to the boys. To add to their interest is the fact that each gets ten per cent. of the sale price of the bird houses he makes, and while the industry is not yet a year old a good business has been built up and it is steadily growing.

A director says of Allendale and the work done there:—

"We have perhaps too little thought of Allendale in her relation to the great uplift movement. We have been entirely concerned with the individual boy, his quality, tendencies and progress, and each year have sent out a small group and made an annual report of the expenditure of a large sum of money; and those bent on striking a balance have perhaps felt that results were not commensurate with the outlay. But we must



A WREN HOUSE.
Quincy Model.



BLUEBIRD HOUSES.



PHOEBE OR ROBIN SHELF.

remember that when we increased our number from the original five to seventy-five we took our place in the costly movement of Institutionalism, and that we are in the press of a day whose watchwords are equipment and efficiency. So in counting the cost we must consider our dues to this larger account. It will not be out of place to say here in privacy of our annual meeting that a certain representative of the German Judiciary sent here to visit American institutions, when asked by a resident of Hull House what had most impressed him, replied without reservation "Allendale."

A short time ago a Japanese student of sociology said that his visit to Allendale had crystallized his idea of what he wanted to do on his return to his native country. The letters of appreciation from an English delegate to the Prison Reform Congress, and those of some Russian social worker, who were our guests, suggest that our work together for the individual boy is yet not without bearing upon the great question of

child welfare. However, Allendale's chief concern must always be the individual boy. We are willing to work in this slow, costly way because it seems to us the only way to work, and because the redemption of society can only come through the redemption of its units. The Alumni speech of one of the seventy is somewhat illuminating and perhaps of more value than the words of any onlooker. He had come to us years ago, a rollicking young Irishman, and on returning to the city to High School, the only opportunity for a living that presented itself was to take charge of the dormitory of a working boys' home. "Some of the boys were men," he said, "and most of them older than I was. They were the roughs and toughs of Chicago, but my Allendale experience stood by me; I saw that the difference between those fellows and myself was my training."



MARTIN HOUSE.

St. Armand Model, Twenty Rooms.



A PLANTING OF CATALPA.

THIS WAS GROWN FROM SEED PLANTED IN MARCH, 1909, THE SEEDLINGS BEING TRANSPLANTED THIRTEEN MONTHS LATER AND THE PHOTOGRAPH TAKEN IN MARCH, 1914.

A CATALPA GROWTH

PRESIDENT ADALBERT STRAUSS, of the Malvern Lumber Co., of St. Louis, Mo., sends AMERICAN FORESTRY the picture at the head of this article. It is a view of his catalpa speciosa plantation, near Malvern, Ark., which he says he believes will compare favorably in straightness and length of bole with any other. The following description is given:

We sowed the seed in March, 1909. Seedlings transplanted April, 1910.

The year's growth cut down to the ground in March, 1911.

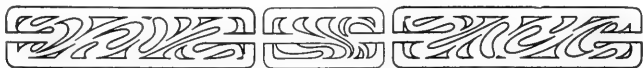
Protographs taken in March, 1914.

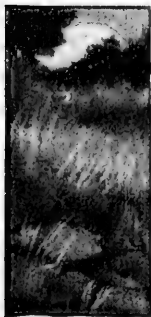
The man in the picture is fully six feet tall.

The land is cut-over pine, thin, sandy loam, with gravelly clay subsoil.

Do you not think the growth of three years, from the time the saplings were cut down, quite remarkable?

The background shows natural reproduction of pine, having been cut over twice since 1880.





CANADIAN DEPARTMENT

By ELWOOD WILSON

THE sole topic in Canada at present is the war and Canada is determined to stand by the Empire to the last gasp both with men and money. A million bushels of wheat have been contributed by the Dominion Government, large quantities of cheese and potatoes and other products by the several provinces and all the employees of the Canadian Pacific Railway have given a day's pay each. Nearly 23,000 men are in training at Valcartier, near Quebec, awaiting the call of the British War Minister. Meanwhile an era of retrenchment and economy has set in which, while wise in principle, has been carried too far in practice. Many firms have stopped work and all have cut down their forces, throwing thousands out of employment just at the beginning of winter and much suffering will ensue. Outside of the fact of war there is nothing in the state of business to warrant such drastic curtailment, as Canada is now in a position to supply to Europe and South America all the goods heretofore made in Germany, France, Belgium and Austria. By this curtailment she is likely to lose these opportunities.

Apropos of the above an English agent has been sent out to Canada to buy for the English colliers over 80,-

000 cords of mine props, five feet to six feet long and averaging five inches in diameter. The supply has been shut off from the countries lying on the Baltic Sea and the mine owners have been compelled to turn to Canada. Any kind of wood will be taken, but it will be a difficult matter to get these timbers and not an unmixed blessing for the forests. Owing to Government regulations such sizes cannot be cut on Crown lands and the whole amount must be obtained from freehold lands mostly in the hands of men owning from two to three hundred acres. If such trees are cut as will be suitable the future supply of pulp wood will be very materially decreased and the trees will be cut at the time when they are making their most rapid growth.

The forest fire situation has been very good this year in Quebec with one exception. Early in the spring there was a severe drouth and right in the height of the dry weather the contractors for the new Government Railroad ordered their section men to burn old ties. The fire rangers warned them not to, but in spite of this they persisted and the fire spread over twenty-five square miles, entailing a cost of over four thousand dollars to extinguish it. These same contractors' engines set fire along

sixty miles of railway, burning the timber back in some cases more than a mile from the track. On August 2d eight fires were still burning. This new railway has not yet been put under the control of the Railway Commission's Fire Protection Department and both the Province of Quebec and the Fire Protective Associations are powerless. This shows a curious anomaly. A Government striving with all its might to prevent forest fires and yet itself setting the most of them and devastating a virgin country whose only resource is its timber.

Professor Toumey, head of the Yale Forest School, is making a long canoe trip through the central part of the Province of Quebec with Messrs. Rothery, of Vitale & Rothery, and Mr. S. L. de Carteret, of the Quebec & St. Maurice Industrial Co. They will make an examination of the timber and discuss the best methods of handling. On their way in they visited the Laurentide Company at Grand Mére and were the guests of the Forestry Division.

Mr. Piché, Chief Forester of Quebec, is planning extensive improvements to the Government's Nursery at Berthierville. He will build a commodious house for students and visitors and expects to increase the capacity of the nursery to 1,000,000 trees per annum.

The Quebec Government has postponed its auction sale of timber limits owing to the war.

Hon. W. H. Hearst, Minister of Lands, Forests and Mines in the Ontario Government, has under consideration a scheme to develop the country and at the same time give work to the unemployed. It is to open up alternate quarter sections of land in Northern Ontario by clearing the land and selling the pulp wood. This would prepare the land for settlers at practically no cost to the Government, probably at a small profit. No mention is made of what disposition would be made of the hardwoods.

An investigation of forestry conditions has been made in England and it is shown that there are large areas of land which are only suitable for growing timber and it is estimated that in time \$180,000,000.00 worth of pulp wood could be grown. This is now imported.

The Lower Ottawa Forest Protective Association has had a busy season. At one time five hundred extra men were taken on to extinguish fires. Forty settlers have been arrested, convicted and fined. This will make the work of fire protection during the coming season much easier as the settlers will now have some respect for the laws which had practically become a dead letter through lack of enforcement.

The fire situation in British Columbia has been the worst since 1910, especially in the southern part. Alberta and Northern Ontario have also suffered badly. There is great need for the elimination of politics and the introduction or extension of the merit system in both the Dominion and Provincial Governments.

Ten thousand tons of wood ready to be made into pulp were destroyed on July 24th at the Mills of the Gres Falls Company, the Canadian Subsidiary of the Union Bag and Paper Company at Cap de la Magdelaine, near Three Rivers, Quebec.

Mr. J. S. Bates, who is in charge of the Dominion Forest Products Laboratory, has returned from a trip to North Carolina, taken with the object of investigating the possibilities of distilling British Columbia yellow pine.

The reindeer imported by the Laurentide Company have been successfully distributed to two of their depots and training them for sled work will begin next month. This company have added to their forest plantations 44,000 Norway spruce and red pine from their own nursery, which has been nearly doubled in size.



EDITORIAL

WITH a business sense which is most commendable, the National Forest Reservation Commission, acting upon the advice of the Forest Service, has, after waiting three years, finally completed the purchase of an 85,000-acre tract of forest land in the White Mountain region. This tract cost at the rate of \$8.50 an acre, whereas, had it been purchased three years ago, the price would have been \$28.60 an acre.

At the time the purchase was first proposed the members of the Commission fully appreciated the desirability of acquiring these lands to add to those already secured in the Appalachian system, but officials of the Forest Service, after a painstaking investigation, reported that the price was far too high. Since then, although the members of the Commission were at times criticized for not taking over the tract, the effort to have the price reduced has continued until it now becomes Government property at a saving of practically twenty dollars an acre, or a total of about \$1,700,000.

The land includes Mt. Washington, Mt. Jefferson and Mt. Adams, all of which, owing to their scenic value as well as their value as a health and a recreation ground, properly belong in

the Appalachian reserve, and now will become the property of the people for all time. The Department of Agriculture, through the Forest Service, will encourage the public use of these lands in all the ways that it is feasible to use them and particularly for summer camping grounds, it being contended that summer campers, with proper restrictions as to their use of the forest, are of actual value in taking care of the forest. Another value which the purchase has, and a great one, is the protection of land which is the keystone or the hub of the drainage system of the White Mountain area.

Many careful students of the forest conditions predict that the growth of timber on Government land in the Appalachian system will in the future be of decided importance in supplying the lumber markets in the East, and such a growth will come with the protection of the land which is assured by its administration by the Forest Service, and by the replanting of denuded sections, which is one of the plans in the future management of the land.

There are a number of other areas which should also be acquired and it is quite safe to venture the prediction they will be when the price is satisfactory and the money is available.

TOO little appreciation of the value of shade trees is evident in many towns and cities throughout the United States. The residents and the city officials do not realize how much more attractive

their city would be if it had well-shaded streets and trees about the residences. Perhaps this is because the majority of them have never seen such streets, as, for instance, those in Washington. It is a condition which may

be overcome by education, and AMERICAN FORESTRY proposes to devote some space each month in the future to articles and discussions relative to shade trees, the kind to select for different street conditions, how to cultivate them, protect them from insects and disease and how to treat those which are decaying.

There is need for experts in shade tree conditions who are competent to fill positions for the care of a city's trees, as it will not be many years before all the progressive cities in the country will have shade tree commissions, or departments having power to engage men to care for their shade

trees. Provision is now being made for the apparent need of these men by several of the colleges which have already inaugurated, or are contemplating inaugurating, a department for the training of experts in shade tree work.

Several cities where the value of such trees has been appreciated, have shade tree departments which not only provide for trees owned by the public, but give service for those privately owned, and in every instance, where the management is competent and the appropriation sufficient to meet the needs, the citizens have reason to be proud of the result.

WHILE it may be many years before municipal forestry appeals to a number of communities in the United States, the fact that it could now be profitably conducted by many of them is certain. There are close to nearly every city, particularly in hilly or mountainous sections, tracts of waste land, some once having a luxuriant forest growth, which could be acquired for a comparatively small sum. On these tracts a city could establish a municipal forest which would not only be a profitable investment but could, if required, be used in part as a public park.

This waste land, planted at slight cost, with seedlings in many States provided free of charge, would in a few years become productive and in a generation or two or three be a source of considerable revenue to a city.

When it is stated that all of the taxes of many German towns and villages are paid, electric lights, power, paving and all town necessities provid-

ed free of charge out of the revenue derived yearly from municipal forests, the reply is often that conditions are so different in this country. True, they are different, but they are growing less so. Timber in the United States was in the past so abundant that few ever thought of the need of conserving it, but for some years past serious thought has been given to the timber needs of the future and how to provide for them, and the problem is not yet solved by any means. Municipal forests would not provide for all that might be needed a hundred years from now, but they would certainly prove a source of revenue to any city owning them. Therefore, as it is quite true there is waste land close to nearly all cities, and as this land could be purchased, planted and protected at small cost, good judgment declares that it is practically the duty of wide-awake communities to give some thought to the question of what they may be able to do in this respect.

NO MORE striking demonstration of the value of various accepted systems for protecting the forests from fire can be had than the reports which are now being received of the results of the fire season which has about reached its end. This is particularly so in relation

to the heavily wooded Pacific slope. The season has been an unusually bad one all throughout the country. Rain has been scarce and hot weather and drouth prolonged, and in addition to the danger thus caused the winter was mild and far less than the normal quantity of snow lay on the forested slopes.

These conditions increased the danger of fire starting and of the flames spreading rapidly to a very great degree, and yet all the reports indicate that the fire losses for the season are comparatively small. There have been numerous fires, more in number than in any season for some years past, but the quickness with which such fires were discovered by the forest patrols and fire wardens and the rapidity with which, under well organized systems of protection, it was possible to get fire-fighters to the danger points resulted in the fires, in the majority of cases, being extinguished quickly or else confined to an area where they did but little damage.

While the newspapers may have, in their reports of fires, conveyed to the public mind the impression that tremendous damage was being done and that fires were sweeping the forests for miles, investigation showed that many of the fires which received the most attention from the press were on brush land of comparatively little value and that the losses thereby were trifling.

The reports so far received by the American Forestry Association lack de-

tail. This will come later and be of decided interest, for it will then be possible to report the actual loss and the actual cost of the fire protection work. Warned by the light snows that the season might be a bad one, the Forest Service, State organizations and timber protective associations early prepared themselves for a hard campaign, with the result that the fire patrol was more than ever efficient, and more patrolmen were placed in the national, State and private forests than in any year since the necessity for fire protective work became apparent. There was also marked improvement in means of communication with fire-fighting headquarters, more telephone lines to mountain lookouts were built, more roads and trails for quick access to danger points were opened and more money was spent than in any previous year, but all this proved, as the nature of the season developed, the best kind of safety insurance.

It is certain that the success of the protective work during the season will result in the formation of more organizations by private owners and give an additional impetus to national and State forest protection work.

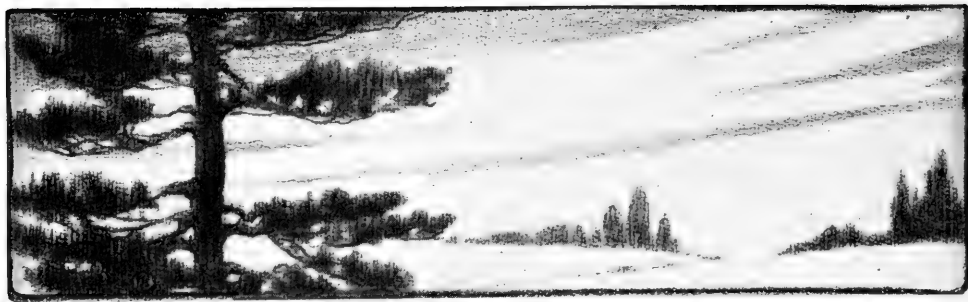
THE Secretary of Agriculture has just signed an agreement with the State of West Virginia for co-operative protection of the forests of the State from fire. The Weeks law authorizes the Federal Government to undertake such co-operation with States for the protection of forested watersheds of navigable streams, provided the State has a fire protective system and will expend a sum at least equal to that expended by the Government.

The agreement provides for patrol of those portions of the watersheds of the Potomac, Monongahela, Little Kanawha, and Great Kanawha Rivers where fires are most likely to occur. Lookout stations connected with telephone will be established on prominent points, from which fires can be discovered quickly, and prompt notification given to the patrolmen, county

fire wardens, and other reliable persons. Patrolmen will cover on foot or horseback the lower country, extinguishing any small fires that may start and cautioning persons met in the woods against carelessness.

For this work the State will expend \$5,000 a year from its appropriation of \$10,000 for forest, game, and fish protection, and the Federal Government agrees to expend an equal sum.

This protection will go hand-in-hand with the work already being done by the Federal Government on the areas it has purchased in the State for national forests. It has been demonstrated, according to forestry officials, that the greatest efficiency is secured through the co-operation of all protective agencies, including the national Government, the State, associations of private timber owners, railroads, and other organizations.



FOREST NOTES

Wherever trees in quantity are needed for shade and ornament there will be need of a trained arborist to care for these trees. In our State and National preserves, as well as in many of the large city park areas, and in woodland areas, privately owned, men are really needed with a training not only in forestry, but also in landscape engineering. Many cities are now employing trained city foresters. For example, the city of Buffalo, N. Y., during the last eight or ten years has employed a trained city forester. Last year the city expended about \$75,000 for city forestry work. Today Buffalo is recognized as having the best tree growth of any large city in the country. The widespread interest in shade trees which is being manifested seems to indicate that in a very short time there will be a great demand for men thoroughly trained in every phase of plant growth.

Upon the recommendation of Secretary Lane, the President recently eliminated from the Fishlake and Manti National Forests in Utah 45,870 acres of land. This land will be subject to settlement only under the homestead laws from and including 9 o'clock a. m., October 19, until and including November 15, 1914, and thereafter will be subject to entry and disposition under any of the applicable public land laws. The lands are largely unsurveyed and are in Sanpete and Sevier Counties.

Upon the Secretary's recommendation, the President has also eliminated from the Challis, Lemhi, Salmon and Sawtooth National Forests in Idaho, 193,660 acres. These lands are largely unsurveyed, high, grazing lands and are in Blaine, Custer, Fremont, Jefferson, and Lemhi Counties. About 176,100 acres are unentered and all of the lands are withdrawn except 308.50 acres which are in a power-site withdrawal.

With the increased attention that is being given to all matters pertaining to the right development of shade trees and the improvement of areas for the growth of these trees, there is a demand for men thoroughly trained along lines of arboriculture of city forestry. To properly prepare young men for positions which are constantly opening in this comparatively new field of work is the object of a well developed four years' course which the New York State College of Forestry is giving at Syracuse University.

Under a special Act of Congress two years ago, the State Agricultural College of Colorado was granted the privilege of selecting certain tracts of forest land lying either within the national forests or the public domain for use in carrying on the work of the course in Forestry at this institution. This land is selected in areas of not less than forty nor more than one hundred and sixty acres each and includes all conditions from timber line to the plains.

This land has recently been selected and is now being surveyed and marked. It includes some of the best stands of timber to be found in this region. Some of the areas are open land adapted to experiments in high altitude agriculture. These tracts should furnish excellent places in which to carry on the field work connected with the course in Forestry here.

An inspiring musical composition lately published is "The Call of the Wilderness," words by Mr. Scott Leavitt, forest supervisor at Great Falls, Montana, music by Miss Augusta B. Palmer, of the Forest Service, Washington, D. C. The song has been dedicated to the forest rangers. It is especially adaptable to Arbor Day exercises and to forestry and conservation programs. "The Message," words and music by Miss Palmer, published coincident with "The Call of the Wilderness," is a charming little song of the fields and woods.

A short time ago the presence of several members of the Washington office of the Forest Service at the headquarters of District 3, in Albuquerque, New Mexico, where field duty had taken them prompted the members of the District office to propose and carry out a "Get-Together" dinner on a "Dutch treat" basis. The dinner was held at the Alvarado, the Harvey hotel. Those present from the Albuquerque office were: A. O. Waha, acting district forester in charge of the branch of operation; John Kerr, assistant district forester, in charge of the branch of grazing; A. D. Read, forest examiner of the office of grazing; T. S. Woolsey, in charge of the branch of silviculture; Quincy Randles, timber sale inspector, of the office of silviculture; J. O. Seth, assistant to the Solicitor, Department of Agriculture; Lyle A. Whitsit, hydro-electrical engineer; M. M. Cheney, national forest examiner, of the office of lands; Frederic Winn, in charge of land classification, of the office of lands; and James F. Mullen, supervisor of the Manzano-Zuni Forest. Those present

from the Washington office were: Albert F. Potter, associate forester, in charge of the branch of grazing; J. T. Jardine, inspector of grazing; R. Y. Stuart, forest inspector in charge of timber sales, of the branch of silviculture; Bristow Adams, forest examiner, in charge of the office of information; also W. S. Clime, photographer of the Department of Agriculture, and F. F. Moon, professor of forestry at Syracuse University.

Thirty of the Iowa State College forestry students have returned from summer camps held on the Minnesota National Forest. The camp was located on Star Island in Cass Lake, where fine virgin stands of white pine, red pine and jack pine occur. The camp consisted of twelve weeks' work. The work comprised timber estimating, topographic and type mapping, silvicultural studies, logging, milling, minor forest industries, dendrology and tree diseases. The region of the Minnesota National Forest offers splendid opportunities for the study of logging and milling first hand. The region also presents many silvicultural problems for the student of forestry. The Iowa State College is planning on making the camp at Cass Lake a permanent affair.

The purchase has just been completed by the State Forester of a tract of about 3,000 acres in the town of Underhill, Vermont. This area, which is now the largest of the State's forests, lies on the west side of the Green Mountain range just south of Mount Mansfield. With the exception of about 100 acres of burned land, the whole area is well wooded. It is fortunate that the State could acquire it before the mountain was stripped, because the lumber supply will not only be of great value to the town, but the two streams rising on the tract, Stevens Brook and Lee River, would be seriously affected by deforestation. The price paid was \$3.25 an acre, considerably less than that first asked.

The State Forester is now having a map and careful estimate made of the

entire forest, and intends to begin the improvement of the tract as soon as practicable. The open areas will be reforested next spring, and improvement cutting made as soon as a good market can be developed for the weed trees.

One of the points of interest in this forest is a very beautiful water fall, one of the finest in the State, especially in early spring. The acquisition of this tract makes the total area of State forests about 8,000 acres.

M. J. Nagel, of Santa Fe, N. M., was recently in Washington to give to Senators from his State his views regarding the replanting of denuded forest lands and the gathering of forest seeds. He secured the publication of some vigorously worded statements in the Congressional Record. He says he can teach and will take the contract to reforest every acre of denuded land, abandoned farms and fields in the United States for less than \$5 an acre and guarantees that all the planted area will grow. He calculates that his method will save fifty million dollars in replanting seven and a half million acres. Mr. Nagel says he is eager for a chance to prove his statements, but has not yet found the opportunity to do so on a broad scale.

Residents of Lake Forest, Ill., stirred by the fact that the shade trees on the streets of their attractive town are not getting the proper care, recently held a mass meeting and presented to the City Council some resolutions demanding vigorous action. They mean to see that the City Council does not neglect their request and will do all they can to beautify their streets and gardens by planting appropriate trees and shrubbery and seeing that those already planted receive proper care.

The resolutions quote the fact that the care of trees and shrubbery against ravages of insects and disease is being weakened by ill-advised planting of trees not suitable for the ground and climate and asking the City Council to appoint a permanent commission to safeguard the trees of the city, this

commission to be empowered to superintend such conservation and forestry work as is deemed advisable, to insist on co-operation from private owners, and if possible join with other towns in the vicinity in engaging a competent forester to oversee all advisable work.

Many are the methods prescribed for estimating the value of a shade tree and one of the most recent is that of asking real estate men: "How much, in your judgment, do full-grown shade trees along the street improve the value of the adjoining land for house lots?" This question was asked by the Massachusetts State Forestry Association. The majority of answers ranged from 10 to 50 per cent., while some went so far as to state that a house lot would be worth 100 per cent. more if full-grown shade trees were standing in front of it. A fair average of these answers falls between 25 and 40 per cent. Expert tree appraisers say that a shade tree in good condition and well placed is worth \$1 per square inch of cross section measured at breast height. At that rate a tree one foot in diameter is worth \$113, while a tree two feet in diameter is worth \$452. For the sake of illustration, suppose that we take a good-sized house lot, 50x100 feet, or 5,000 square feet, worth 25 cents a foot. The land value is \$1,250. If the trees are spaced 50 feet apart on the street there would be one tree in front of the property. The tree is two feet in diameter and worth \$452, which would increase the value of the lot 36 per cent.

Donald Matthews, a graduate of the University of Michigan in the class of 1909, has recently accepted an important position with the British North Borneo Company. Although Mr. Matthews is a young man, he has made a record during the last five years in the Philippine Forest Service. He will organize an expedition into the interior of North Borneo and after examining the timber resources of that section, will determine what sort of a forestry department should be organized there.

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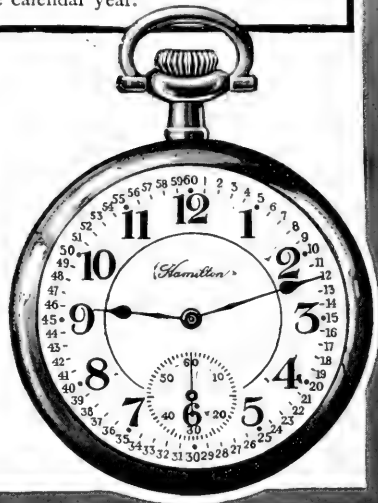
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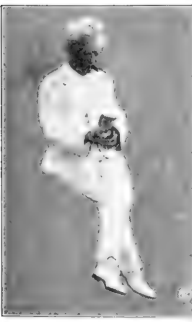
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American Forestry



Vol. 20

November, 1914

No. 11

BOOKS ON FORESTRY

AMERICAN FORESTRY will publish each month, for the benefit of those who wish books on forestry, a list of titles, authors and prices of such books. These may be ordered through the American Forestry Association, Washington, D. C. Prices are by mail or express prepaid.* :-: :-: :-: :-:

THE TRAINING OF A FORESTER—Gifford Pinchot.....	\$ 1.12
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THE FARM WOODLOT—E. G. Cheyney and J. P. Wentling.....	1.70
AMERICAN FOREST TREES—Henry H. Gibson.....	6.00
IDENTIFICATION OF THE ECONOMIC WOODS OF THE UNITED STATES— Samuel J. Record.....	1.25
PLANE SURVEYING—John C. Tracy.....	3.00
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GETTING ACQUAINTED WITH THE TREES—J. Horace McFarland.....	1.75
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THREE ACRES AND LIBERTY—Bolton Hall.....	1.85
MANUAL OF BOTANY—Asa Gray—\$1.62; field edition.....	2.00
TREES OF NEW ENGLAND—L. L. Dame and Henry Brooks.....	1.50
TREES AND SHRUBS—C. S. Sargent.....	5.00
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MANUAL FOR NORTHERN WOODSMEN—Austin Cary.....	2.12
FARM FORESTRY—Alfred Akerman.....	.57
THE THEORY AND PRACTICE OF WORKING PLANS (in forest organization) A. B. Recknagel.....	2.10
ELEMENTS OF FORESTRY—F. F. Moon and N. C. Brown.....	2.20

* This, of course, is not a complete list, but we shall be glad to add to it any books on forestry or related subjects upon request.—Editor.

Declaration of Principles and Policy of the American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies:

FEDERAL ADMINISTRATION AND MANAGEMENT of national forests; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

STATE ACTIVITY by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners; non-political departmentally independent forest organization, with liberal appropriations for these purposes.

FOREST FIRE PROTECTION by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

FOREST PLANTING by Federal and State governments and long lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

FOREST TAXATION REFORMS removing unjust burdens from owners of growing timber.

CLOSER UTILIZATION in logging and manufacturing without loss to owner; aid to lumbermen in achieving this.

CUTTING OF MATURE TIMBER where and as the domestic market demands it except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.

EQUAL PROTECTION to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

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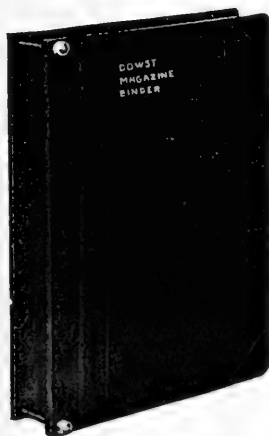
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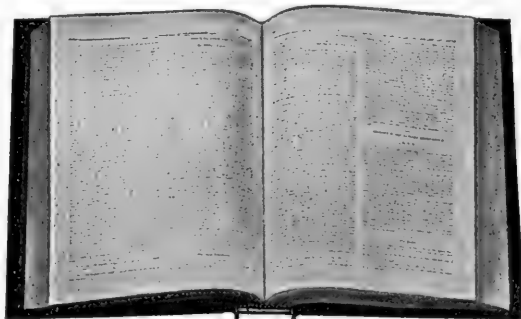
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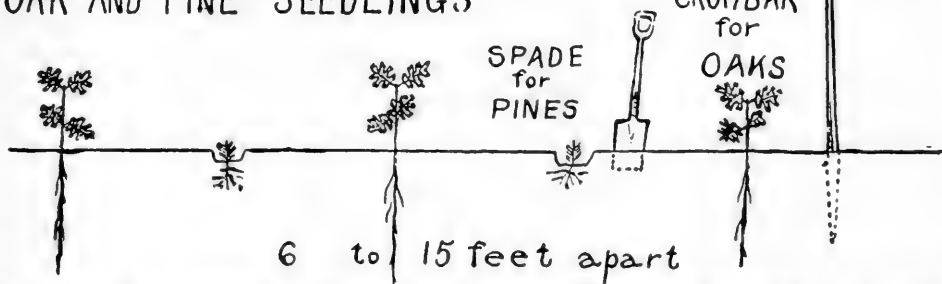
"THE WORLD'S GREATEST WOODLOT"—by George S. Long, of Tacoma, Wash., in

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The Magazine of the American Forestry Association

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November	CONTENTS	1914
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FRENCH FORESTS IN THE WAR ZONE—By Samuel T. Dana.....	769
With fourteen illustrations.	
FIRES—(A Poem)—By Bristow Adams.....	786
With two illustrations.	
THE MEADOWS OF THE SIERRA—By Neal T. Childs.....	788
With seven illustrations.	
THE REDWOOD OF CALIFORNIA—By J. H. Browne.....	795
With seven illustrations.	
AN EFFECTIVE FORESTRY EXHIBIT.....	802
With one illustration.	
WOOD PULP FOR SAUSAGE CASING.....	804
BALTIMORE'S SHADE TREES—By R. Brooke Maxwell.....	805
With six illustrations.	
A TRIP FOR REINDEER—By Arnold Hanssen.....	810
With five illustrations.	
FENCE OFF WOODLOTS.....	813
THE EARLY LOGGER IN THE SIERRAS—By Alexander W. Dodge.....	815
With six illustrations.	
PRIVATE REFORESTATION—By M. H. Hoover.....	820
With four illustrations.	
CANADIAN DEPARTMENT—By Elwood Wilson.....	825
FORESTRY AT THE EXPOSITION.....	828
EDITORIAL.....	829
FOREST NOTES.....	831
BOOKS RECEIVED.....	834
CURRENT LITERATURE.....	834

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FRENCH FORESTS IN THE WAR ZONE

By SAMUEL T. DANA

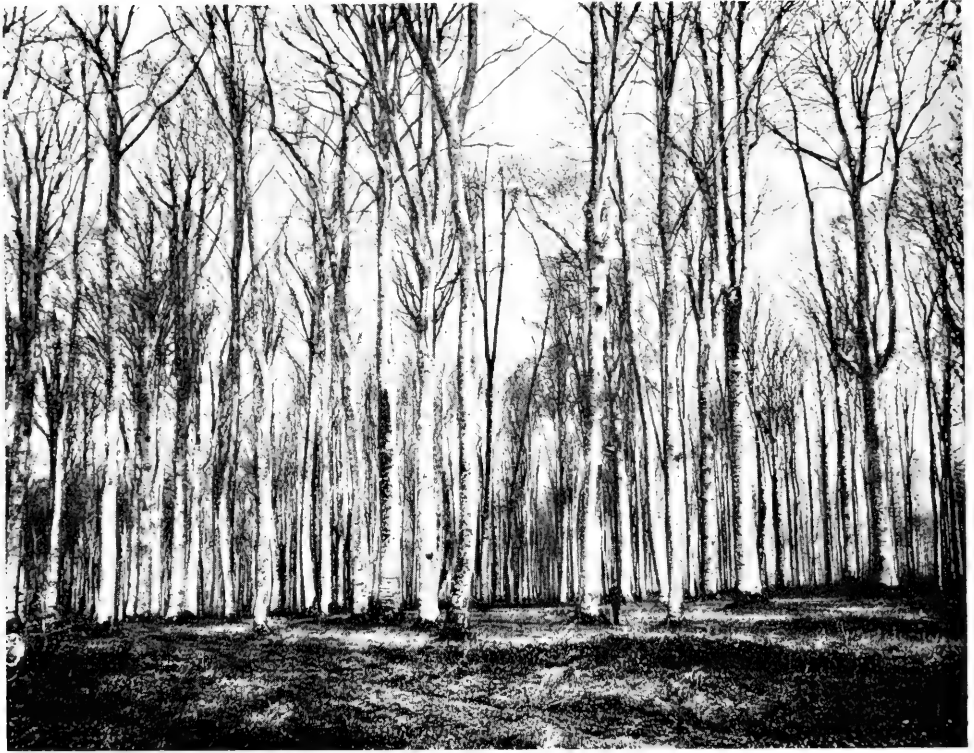
WHEN the history of the present European war comes to be written, it will probably be found that the forests of the regions involved have played a much more important part than is suspected by the ordinary reader. A hint of this is contained in a German news despatch of October 14, which read, "Heavy fighting continues in the Argonnes. Our troops are moving through dense underwood in very difficult ground with siege trains for use against the fortifications. The French troops offer obstinate resistance, firing from trees where machine guns are posted."

It is stated that this same forest of Argonne, which has been the scene of such vigorous and continued fighting during the present war, enabled the French to repulse the Prussian attack of 1792, and nearly eighty years later, in 1870, at the time of the Franco-Prussian war, concealed the maneuvers of the Germans before their crushing defeat of the French in the battle of Sedan. To the westward the forest of Orleans is said to have given the French the opportunity of rallying for their final stand in 1871; while to the eastward the forest of Soignes, by the shelter which it offered to Wellington's forces, contributed to the defeat of Napoleon at Waterloo.

That the French Government itself recognizes the forests as a means of defense is shown by a provision in the Code Forestier, adopted in 1829 and still the forest law of the land, that

private owners can be prevented by the Government from clearing away forests at the frontier wherever these are deemed necessary for defensive purposes. There can be no question but that they are in fact a decided advantage to the army having possession of them. First of all they offer a serious obstacle to the advance of the enemy. Troops can not march nor can artillery trains be transported rapidly through dense woods, particularly when it is possible to block the few roads leading through them by fallen trees. In Alsace, so I was informed by an eye-witness, the first step taken by the Germans after the declaration of war was to barricade every road as effectively as possible in this way. Presumably the French did the same thing in their own country wherever they were forced to retreat. That the blockades established in this way were effective in checking the advance and wasting the strength of the enemy can hardly be questioned.

Furthermore, the forest forms an excellent shelter from which an army can fire upon an advancing enemy, while itself remaining in comparative security. It is easy to imagine an infantry or a cavalry charge across an open plain against an opposing army entrenched on the edge of a forest being repulsed with tremendous loss. On the other hand, there would be situations, particularly in level country, where the forest would present a serious obstacle to artillery fire, and considerable areas have probably already been cut over, in this as in other wars, to afford a



A FOREST IN NORTHEASTERN FRANCE.

ON SUCH LAND AS THIS THE TROOPS OF BOTH SIDES FIND HIDING FROM THE SPYING AIRMEN, AND THE COMMANDERS CONSIDER IT A GREAT STRATEGICAL ADVANTAGE TO THUS BE ABLE TO MASK THE MOVEMENTS OF THEIR MEN.

clearer field and wider range for the batteries.

The value of a wooded cover in masking fortifications must also not be overlooked. A correspondent with the German army in describing the fortifications about Metz has stated that they were so skilfully concealed by woods and blended with the hillsides that nothing out of the ordinary was apparent. This is in striking contrast to the forts at Liège which, being unprotected in this way, stood out so boldly against the sky line as fairly to invite bombardment. The correspondent further stated that in one particular battery which he visited overlooking the River Meuse, the guns were placed behind a screen of thickly branching trees with the muzzles pointing to round openings in this leafy roof. Even the gun carriages and tents were screened with branches, while a hedge of boughs was constructed around the

entire position as a protection against spies. This battery had been firing for four days from the same position without being discovered, although French aviators had located all of its sister batteries so accurately that they had suffered considerable loss from shrapnel fire.

The present war is, of course, the first in which the forests have exercised this important function of concealing the positions and numbers of the various armies from the vigilance of the enemy's airmen. In open country nothing is more simple than for an aviator to determine with considerable accuracy the strength, position, and movements of the enemy's forces. In a forest this is impossible, and to the concealment which it affords can probably be attributed mainly what few surprises the strategists of the contending countries have been able to bring about in spite of aviators and spies. To the latter the



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BELGIANS USING A TREE AS A BARRICADE.

WHEREVER THERE WAS OPPORTUNITY TO CHECK THE ADVANCE OF THE ENEMY IT WAS FOUND VALUABLE TO SHELTER THE MEN BEHIND FELLED TREES. NOTE HOW ALL THE YOUNG GROWTH HAS ALSO BEEN CUT DOWN TO CLEAR THE ZONE OF FIRE FROM OBSTRUCTION.



From The Illustrated London News.

HAVOC AMONG WAYSIDE TREES.

ON ROADS ALONG WHICH THERE HAS BEEN MUCH FIGHTING MOST OF THE TREES ARE DESTROYED EITHER BY ARTILLERY FIRE OR ARE CUT DOWN TO MAKE BARRICADES OR HAMPER PURSUIT. ON THIS ROAD THE GERMANS PASSED ON THEIR RETREAT FROM THE MARNE.

forest offers an excellent opportunity for effective scouting. Natives of the country, thoroughly familiar with local conditions, find it comparatively easy to steal by outposts and to observe the enemy without being detected.

In the war zone of northeastern France conditions as regard forest cover vary widely. In the roughly rectangular area to the northeast of the Seine and northwest of the Oise, the country is for the most part very flat, and is almost wholly given up to agriculture. To the south of the Oise and the Aisne, it becomes more undulating, with low hills, and here the farming land is interspersed with patches of forest and woodland. Still farther to the south and east along the Meuse River and in the Vosges Mountains, the country becomes still more rugged and the forests more abundant.

The topography and the distribution of the forests throughout this region probably account largely for the decision

of the Germans to hurl their main attack against France through Belgium rather than through the more difficult route to the south. To these factors can also be attributed in large measure the rapid advance of the right wing of the German army in the early stages of the war, while the left made little or no progress. In the north the comparatively level, unwooded country interposed practically no obstacle to the free movement of the armies, and as a result the early advance of the Germans here was almost incredibly swift. During the same period, farther to the south in the region of Verdun and Nancy, the rugged, heavily wooded country, in conjunction with fortifications and strongly entrenched troops, held both armies practically stationary.

To what extent the forests in the war zone will be injured during the progress of the war is problematical. That they will suffer more or less, however, can not be doubted. Much wood will be



From the Illustrated London News.

NEAR THE FORT FROM WHICH RHEIMS CATHEDRAL WAS SHELLED.

A FRENCH ATTACK ON A GERMAN ENTRENCHED POSITION DURING THE SIEGE BATTLE OF THE AISNE. IN THIS TERRIFIC FIRE TREMENDOUS DAMAGE WAS DONE TO BOTH MATURE TREES AND YOUNG GROWTH. IN THE WOODS IN THE VICINITY THE BATTLE RAGED FOR MANY DAYS.



THE FOREST OF FONTAINEBLEAU.

HERE WERE GATHERED MANY THOUSANDS OF FRENCH RESERVES, DURING THE TIME THAT THE GERMAN ADVANCE WAS DRAWING CLOSE TO PARIS. THIS IS A WELL STOCKED MIDDLE AGED STAND OF EUROPEAN OAK.

cut for fuel and construction work; trees will be felled to block roads; whole stands may be leveled to clear the way for artillery fire; and the rain of shot and shell will do much damage to standing trees, much more than the damage done similar forests in the Franco-Prussian war. Equally serious will be the havoc wrought by forest fires. These will be set not only by accident, but also purposely in order to harass the enemy. This was the case in the Forest of Compiègne, which is said to have been fired by the British in order to drive out the Germans. While the fire may have been effective from this point of view, it also doubtless destroyed very largely the natural beauty of the famous forest and seriously disarranged the carefully laid plans for its management. If the war lasts as long as experts predict, it is certain that large sections of the forests in which the armies will operate will be cut down for fire wood. To date it is evident that there has been much cutting^d of young growth to use as

screens in hiding entrenchments and masking batteries. Cathedrals and other edifices are not the only objects that have been devastated. Like the cities and towns, the forests will for many years bear unmistakable evidence of the ravages of war, and in many cases the damage done them will take much longer to repair.

And what of the character of the forests which are having such an important influence on military operations and which will in turn be so profoundly affected by them? The achievements of the French foresters in reforesting large areas of barren sand dunes and limestone wastes and in controlling mountain torrents have been widely proclaimed. Less is known, however, of French forestry and forest conditions in general, and a brief account of a few typical forests in the war zone may therefore be of interest at the present time.

Near Compiègne, the scene of Joan of Arc's capture in 1430 and of a Ger-



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GERMANS ON DEFENSE IN THE VOSGES FORESTS.

GERMAN INFANTRY TAKING ADVANTAGE OF THE SCREEN AFFORDED BY A PATCH OF WOODS WHILE BEING ATTACKED BY THE FRENCH IN THE VOSGES MOUNTAINS. HERE THEY WERE EXPOSED TO A GALLING RIFLE AND ARTILLERY FIRE AND MUCH DAMAGE WAS DONE TO THE TREES BY THE BULLETS AND SHELLS. THUS PIERCED AND INJURED THE TREES ARE EASY PREY FOR INSECTS AND DISEASE.



Courtesy of the New York World.

TREES FELLED TO DEPRIVE THE ENEMY OF COVER.

HOW MANY A TRACT OF WOODLAND AND OF FOREST WAS CUT DOWN TO PREVENT THE GERMANS TAKING ADVANTAGE OF THE GOOD COVER AFFORDED BY WOODED LANDS. TREE TRUNKS THUS SECURED ARE FREQUENTLY USED IN BARRICADES OR IN TRENCHES.

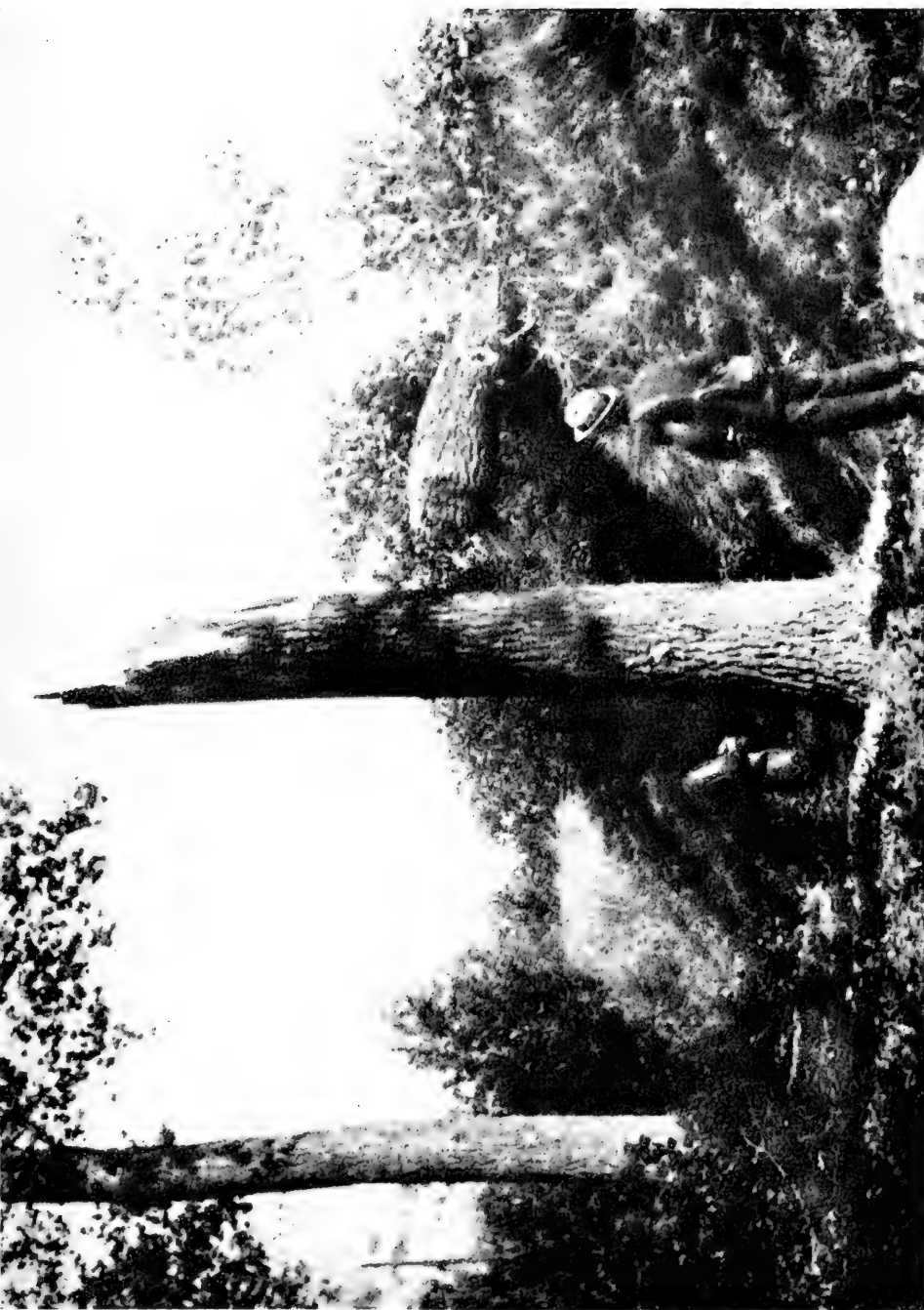
man victory in the present war, lies the state forest of Compiègne where there has been severe fighting. This forest, which is situated at the junction of the Aisne and Oise Rivers, only 52 miles northwest of Paris, comprises 36,072 acres and is the fourth largest state forest in France. As in most of the other forests in this part of the country, the principal trees are oak, beech, and hornbeam, with a few other broadleaf trees and a small representation of conifers. Although the growth in general is rather slow because of the poor soil, one oak, popularly known as the "king of the forest," is said to be the largest oak tree in France. It has a total height of 118 feet, a circumference of 17 feet at breast-height, and an estimated volume of 1,120 cubic feet. While these figures do not seem very large in comparison with the sizes commonly reached in this country by such trees as yellow poplar and cottonwood, its estimated value of nearly \$500 undoubtedly exceeds that of any individual tree of these species here.

Previous to the war the forest of Compiègne, with its wealth of old oaks and its network of roads, was regarded as one of the finest in France, rivalling even the famous forest of Fontainebleau. One section of the forest, known as the Beaux Monts and comprising some 1,753 acres, has in fact been set aside for special treatment to preserve its natural beauty. Near by is the fine old palace of Compiègne, which, with its valuable

decorations and furnishings, was a favorite residence of the two Napoleons. A striking feature of the scenery here is an avenue 150 yards wide and 5 miles long, cut through the forest by the first Napoleon in order to afford a pleasing view from the palace.

All of these facts, together with its proximity to Paris, have combined to make the forest of Compiègne a favorite hunting resort. Up to 1870 it had been for centuries the hunting and shooting ground of the rulers of France, and since the establishment of the present republic it has been equally popular with the nobility and wealthy members of Parisian society. Some 2,000 acres are now reserved as a game preserve for the President of the Republic and the State guests. In recent years the revenue from hunting licenses alone has amounted to nearly \$20,000 a year, out of a total gross revenue of \$167,000. It is interesting to note, however, that this use of the forest has its drawbacks from a strictly forestry point of view. The preservation of the game, and especially of rabbits, endangers the young growth to such an extent that it is necessary to fence most of the areas under reproduction, of course with greatly increased expense of management.

A short distance to the southeast of Compiègne lies the little village of Villers-Cotterets, the birthplace of the elder Dumas and formerly the seat of an important secondary forest school



From the Illustrated London News.

EFFECT OF A SHELL ON A TREE.

THIS TREE WAS STRUCK BY A BRITISH SHELL DURING AN ATTACK ON GERMANS HIDDEN IN HEAVY WOODS, AND WAS ONE OF A LARGE NUMBER DESTROYED DURING THE SEVERE FIRING.



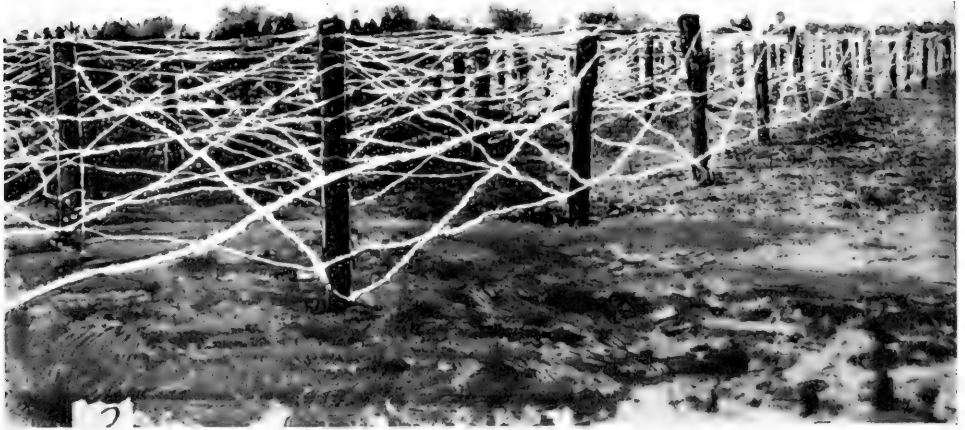
A FOREST IN NORTHWESTERN FRANCE.

FOREST OFFICERS SUCH AS THESE SEEN IN THE PICTURE WERE AMONG THE FIRST CALLED TO THE FRONT AND ALREADY MANY OF THEM ARE NUMBERED AMONG THE DEAD, WOUNDED OR MISSING. SUCH AREAS HAVE BEEN THE SCENE OF MANY VIOLENT ENCOUNTERS BETWEEN THE ALLIES AND THE GERMANS.

for the training of subordinate forest officers. The town is surrounded on three sides by the state forest of Retz, where French reserves were encamped at the time the Germans were so close to Paris. This is an area of 32,044 acres situated between the Aisne and the Oureq Rivers. In many respects this closely resembles the forest of Compiègne, with which it compares favorably, having, indeed, the reputation of being one of the finest and best managed beech and oak forests in France. Although situated at a slightly higher elevation, from 200 to 800 feet above sea level, the topography is practically the same and in both forests the stand is composed mainly of oak, beech, and hornbeam. A century or so ago the forest contained some splendid specimens of oak, which were used for the French navy. Since then, however, the oak has been largely cut out and the proportion of beech has increased to an

undesirable extent. Consequently the aim of forest management here, as in most of the broadleaf forests of France, is to increase the amount of oak. In 1672, during the administration of Colbert, Louis XIV's noted minister of finance, a system of cutting known as "tire et aire" was introduced, which provided for what was practically a clear cutting with the retention of about 8 beech or oak trees per acre to serve as standards for the production of large-sized material and to furnish seed for natural reproduction. Although not entirely satisfactory in its results, this system was continued until 1830, when it was superseded by the shelterwood system, which is still in vogue. Natural reproduction is also assisted to some extent by oak planting, at a total cost of nearly \$20 per thousand plants.

Like the forest of Compiègne, the forest of Retz is also a favorite hunting ground because of its proximity to Paris,



By Courtesy of the New York World.

BARBED WIRE ENTANGLEMENTS OUTSIDE OF ANTWERP.

BOTH THE ALLIES AND THE GERMANS HAVE FELLED THOUSANDS OF TREES TO MAKE POSTS FOR STRINGING BARBED WIRE ENTANGLEMENTS LIKE THESE SHOWN IN THE PICTURE, OUTSIDE OF CITIES AND IN FORTIFIED PLACES ALONG THE BATTLE FRONT.

its natural beauty, and the abundance of game. It is, however, not quite so popular, and the annual income from hunting and shooting leases averages only about \$7,000. When damage to surrounding crops is caused by the game, particularly the red deer, the lessee of the hunting license is forced to make good the damage to the injured farmer.

An interesting feature of the timber sales here is that they are all made in September of each year by "Dutch auction." The trees are first offered at a price higher than it is actually expected to realize, and this is then called down by the auctioneer until some one cries out "je prends" (I take). An annual revenue of about \$122,400, or approximately \$3.80 per acre, is received from sales of wood alone. Another interesting feature is the utilization of the heavy crops of beech nuts which occur about once in every seven years. One year, salad oil to the value of \$30,000 was made from them, in addition to 300 bushels of seed being sent to other forests in France and sufficient seed retained to restock the cut-over areas. Among the various wood-working industries in Villers-Cotterets is an establishment which turns out annually 400,000 pairs of wooden soles. These are made chiefly by boys and cost 2 cents per pair for labor and 5 cents for wood.

In the extreme north of France, only 65 miles from the North Sea and almost touching the Belgian frontier, lie the state forest of Amand and the private forest of Raismes, in which desperate fighting has recently been reported. Near them is situated the town of Valenciennes, formerly best known as the birthplace of Froissart and Watteau and as the original source of the famous lace of the same name, and recently unenviably prominent in the war despatches.

The forest of Raismes forms a compact area of 3,500 acres, which is surrounded on three sides by the State forest of Amand, comprising 8,190 acres. The latter formerly belonged in part to the abbeys of Vicogne and St. Amand, but at the time of the French Revolution these ecclesiastical possessions were confiscated and joined to the rest of the state forest. The country here is low and flat, having an elevation of only 50 to 100 feet. Owing to its nearness to the coast, the temperature is more equable than farther inland, but because of the lowness of the land late spring frosts are likely to be severe. The forest areas are underlain with coal, and mine galleries extend in all directions below the surface. These often cause a sinking of the land with the formation of swamps and subsequent death of the trees. Sometimes the swamps are filled up with refuse from the mines and replanted.



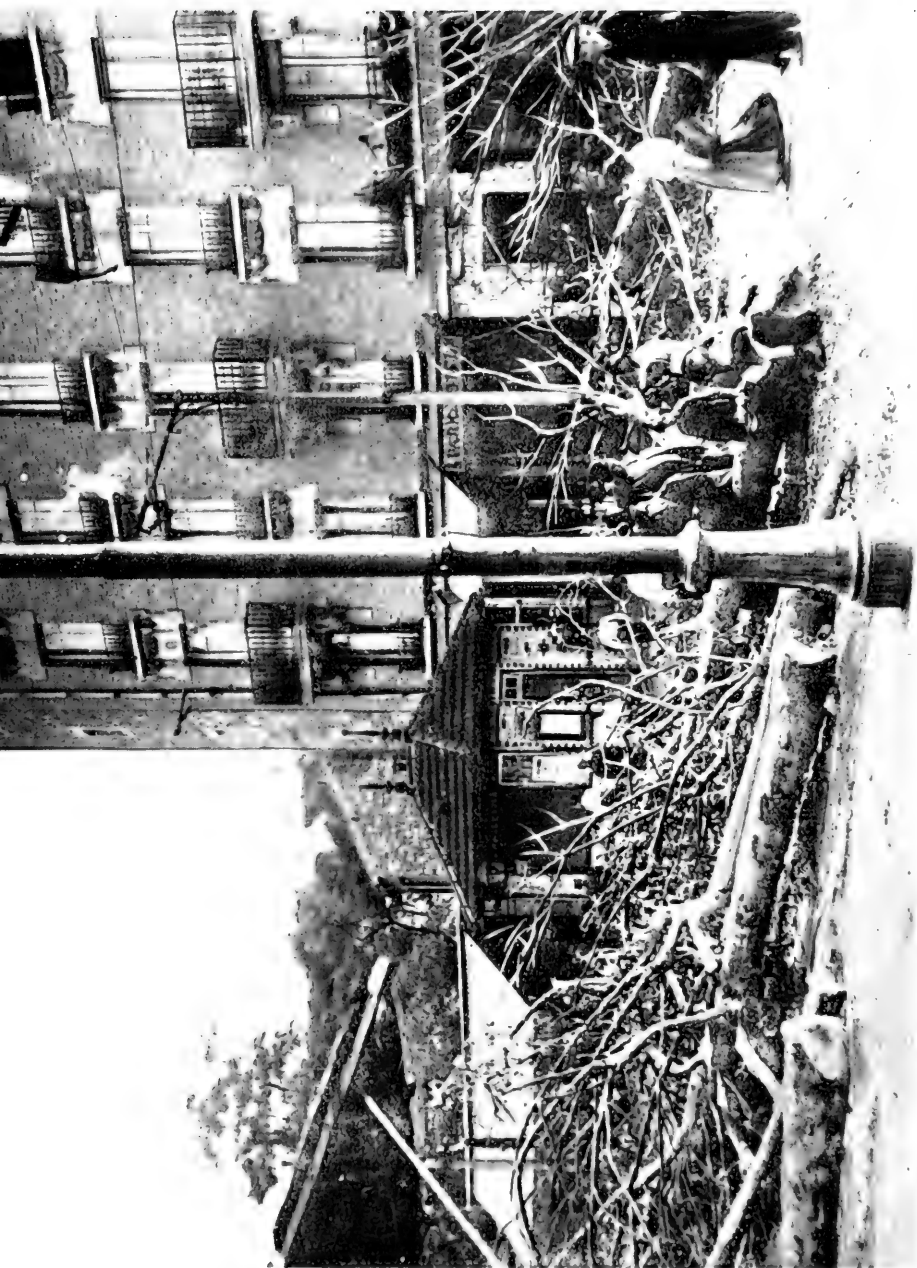
SCENE OF CONSIDERABLE FIGHTING.

IT IS IN SUCH A COUNTRY AS THIS IN WESTERN FRANCE THAT MANY OF THE MOST STUBBORN CONFLICTS BETWEEN THE FRENCH AND THE GERMANS ARE REPORTED.

Unlike the forests nearer Paris, already described, those near Valenciennes contain comparatively little beech. Oak and hornbeam form the chief species, while nearly a fourth of the State forest is composed of Scotch pine. The latter has mostly been planted since the Napoleonic wars on areas which were previously bare heather land. Parts of the forest are managed as coppice under a rotation of from 14 to 25 years, usually also with some standards, while in other parts an effort is made to secure nearly all seedlings. The importance which the French attach to the protection afforded the soil by a forest cover is shown by the fact that they actually plant such species as hornbeam, ash, alder, and sycamore, to serve as an undergrowth and to prevent the drying out of the soil which might result from the excessive opening up of the main stand.

To the southeast of Valenciennes and Maubeuge, where the big fortress was captured by the Germans early in the war, lies the region known by the general name of Ardennes. Long ago

in the days of the Roman occupation this region occupied a vastly greater area than at present, and extended eastward as far as the Rhine. Caesar in his Commentaries described it under the Latin name of "Arduenna silva" as the largest forest in Gaul. With the advance of civilization, however, the forest was gradually cleared away until now the region is restricted to an area some 100 miles long by 40 miles wide divided about equally between France and Belgium. Topographically, the region consists of a series of plateaus, with an elevation of from 900 to 1300 feet and much cut up by deep ravines and valleys, in some places with precipitous cliffs 600 feet high. These conditions contributed largely to the desperate character of the recent fighting in this region. The area is now drained by the River Meuse, a tributary of the Rhine. Geologists believe, however, that in prehistoric times the rivers from this area deposited their sediment on what is now the city of London, since the London basin is the only other place



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SHADE TREES BARRICADING PARIS STREETS.

WHEN THE GERMAN ADVANCE WAS RAPIDLY APPROACHING PARIS AND THE GOVERNMENT FEARED ITS CAPTURE MILITARY ENGINEERS DIRECTED THE BARRICADING OF THE STREETS IN THE OUTSKIRTS. FELLING TREES WERE FOUND TO FORM ADMIRABLE BARRICADES AS THEY HAD DONE ON THE ROADS OVER WHICH THE ALLIES HAD RETIRED FROM THE BELGUM BORDER BEFORE THE GERMANS. THOUSANDS OF TREES WERE FELLED TO BLOCK THESE ROADS.



FOREST ON THE VOSGES MOUNTAINS.

MUCH OF THE FIGHTING IN EASTERN FRANCE HAS BEEN ON GROUND SUCH AS THIS. HERE IS A 100 TO 150 YEAR OLD STAND OF SCOTCH PINE AT AN ELEVATION OF 5,500 FEET. CONIFEROUS FORESTS OF THIS SORT OCCUPY THE UPPER SLOPES IN THE MOUNTAINS.

where the particular clay soil characteristic of this region is found.

While a large part of the Ardennes is forested, there are also considerable areas of marshes, heaths, and barrens. Agriculture is mostly confined to the valley bottoms and is not extensive, but large numbers of sheep and cattle are

grazed. The forests are for the most part composed of the oak and beech typical of so much of France. As elsewhere the stands are managed both for coppice and seedlings. Like the country to the northwest, the region is underlain with coal which is being brought to the surface by numerous mines. The ugly

piles of slag and pit rubbish which are so abundant in similar mining districts in England are, however, apparently scarce. This is due to the fact that these heaps are frequently planted with larch, birch, and other trees, which grow surprisingly well on such sterile soil. In spite of the fact that it is usually necessary to bring in small quantities of earth in which to plant each tree, the result is said to be fairly profitable to the mine owners and is certainly a great benefit to the public from an artistic and health point of view.

A part of the Belgian Ardennes of special interest to foresters is the private forest of Mirwart, which from 1891 to 1903 was the property of Dr. Schlich. When he acquired possession of the area it consisted of some 100 acres of Scotch pine and 2,700 acres of mixed broadleaf trees in a most irregular state. Having observed that Norway spruce had grown remarkably well in the few experimental areas and that the wood was in much demand in the neighborhood for pit props, he determined to convert the greater part of the forest to spruce as rapidly as possible. This work, which has been carried out at a cost of about \$20 per acre, has apparently been very successful. One of the principal difficulties encountered was the fondness of the red deer for young spruce shoots. It was found that this damage could be prevented, to a considerable extent at least, by sprinkling the trees liberally with white-wash, particularly in the spring.

South of the Ardennes is the forest of Argonne, concerning which so much has been heard in the present war as the scene of many vigorous encounters. The region to which the name is commonly applied comprises a rocky, forest-clad plateau some 63 miles long by 19 miles wide extending from the plateau of the Ardennes on the north to the plateau of Haute Marne on the south. On the east it is bounded by the River Meuse and on the west by the Aisne and the Ante. In this district have been some of the most sanguinary engagements of the war. The plateau has an average elevation of about 1,150 feet, and, like the Ardennes, is much dissected by many precipitous gorges.

In addition to its numerous forests of oak and beech, the region is excellently suited to form a natural barrier to any hostile invasion because of the fact that the Aire and other rivers traverse it lengthwise parallel to the French border. The heavy forest cover, the roughness of the country, and the necessity of crossing instead of following up the streams, all conspire to render difficult the advance of an army. It was here that Dumouriez in 1792 held the Duke of Brunswick in check and, by giving the French forces time to rally, made possible the subsequent defeat of the latter at Valmy. In the present war history seems to be repeating itself, and the forest of Argonne has evidently been largely instrumental in helping to prevent the advance of the Germans in that region, when in the more open, level country to the north the movements of both armies covered much wider areas.

Southeast of the forest of Argonne on the Moselle River, only about 10 miles from the border of Lorraine, is the town of Nancy, one of the principal military posts in France and one of the chief objectives of the attack by the German left wing. It is the seat of the only French forest school for the training of technical foresters, although there is another school for the education of subordinate forest officers at Barres. The school at Nancy was established in 1825, up to which time the Government forest service had been made up chiefly of retired army officers who were not specially trained for the work. One of the interesting points connected with the early history of the school is that its first directors were severely criticized for their "unpatriotic" tendency to advocate methods of forest management in vogue in Germany, where they themselves had received their education. So deep-seated was this feeling that the very existence of the school was several times threatened and the first director, Bernard Lorentz, is said to have been dismissed for this reason. The school is organized along military lines and offers a three year course including both theoretical and practical instruction, with considerable field work in the neighboring forests. Only a limited



WHERE WAR'S DAMAGE WILL BE SLIGHT.

A SERIES OF DAMS ON A MOUNTAIN IN NORTHWESTERN FRANCE, FOR CHECKING EROSION. THE MOUNTAIN SIDES WERE REFORESTED WHEN THE DAMS WERE CONSTRUCTED. THERE HAS BEEN MUCH FIGHTING ON SUCH TERRITORY AS THIS WITHOUT MUCH DAMAGE TO THE FORESTS.

number of students, chosen from graduates of the Institut Agronomique, are admitted and on completion of the course are employed by the Government.

West of Nancy lie the two state forests of Champenoux and Haye. The former with an area of 3,509 acres, is situated on the plain between the rivers Meurthe and Seille; while the latter, comprising nearly 16,000 acres and forming part of a larger wooded area of 27,210 acres, occupies the plateau between the Meurthe and the Moselle. East of Nancy are the forests of Bazange and Parroy where battles were fought during the last week of October. In the forests to the west the principal species are oak, beech, and hornbeam in all stages of conversion from coppice to seedling stands. An interesting feature of the forest of Champenoux is the arboretum of 25 acres established in 1900. Here the various trees planted are grouped both by species and by the countries of their origin. Of the American species experimented with,

the white ash, yellow poplar, and western red cedar are said to be particularly thrifty. The soil in the forest of Haye is remarkable for its tendency to dry out, and must be kept constantly covered by a crop with dense foliage in order to maintain its fertility. Parts of both forests are under the management of the forest school at Nancy, which uses them for experimental purposes.

The forests in the Vosges Mountains, to the southeast of Nancy, where there have been numerous engagements, are of a very different character from those already described. The state forest of Celle, for example, which includes an area of 2,925 acres near the town of St. Dié, not far from the border of Alsace, comprises 90 per cent of silver fir and only 10 per cent of beech with a few scattering Norway spruce and Scotch pine. The area has an elevation of from 1,300 to 2,600 feet, and in places the mountain slopes are so steep as to make it impossible to use horses for logging. The forest has some fine

specimens of silver fir. Many of them are $11\frac{1}{2}$ feet in circumference at breast-height and 130 feet tall, while one is $13\frac{1}{4}$ feet in circumference and 140 feet tall. In the best parts of the forest the older stands yield 7,000 cubic feet per acre with a money value of \$1,000. For a time the forest was managed under the shelterwood system, but serious windfalls showed that this system was not suited to mountain conditions, and it has now been superseded by the selection system.

Farther south in the Vosges Mountains lie the communal and state forests of Gérardmer, comprising respectively 2,359 and 11,897 acres. The former has 58 per cent of Norway spruce, mostly planted, 40 per cent of silver fir, and 2 per cent of Scotch pine; while the latter has 50 per cent of silver fir and 25 per cent each of Norway spruce and beech. One tree, known as the Géant Sapin (giant fir), has a circumference of $14\frac{1}{2}$ feet, a height of 157 feet, a volume of 1,095 cubic feet, and is valued at nearly \$135. Curiously enough the beech is particularly abundant at high altitudes, and near the top of the Hohneck occur pure stands of stunted beech with an occasional dwarf silver fir. The general elevation, from 2,000 to 4,000 feet, is considerably higher than that of the forest of Celles, and windfall is more frequent. In

February, 1902, for example, a severe storm blew down 292,500 cubic feet of timber and emphasized strongly the necessity of substituting the selection for the shelterwood system of cutting in the mountains.

The forests described briefly in this article have since the war began played an important part in the operations of both sides. Offering, as they do, an effective and very necessary screen from the vigilant airmen, it has been considered of marked advantage by commanders of the armies, to hold them. They are more easily defended than open country, the trees and underbrush are of immense service in making entrenchments and in blocking roads during a retreat, and they have been used wherever possible for masking artillery.

Military men assert that forests and woodlands have been of greater practical service in this war than ever before, chiefly owing to the protection they afford bodies of troops from spying airmen who direct artillery fire on the enemy's positions.

Hence it is certain that any forests or woodlands within the fighting zone will be an objective for opposing commanders, and that these forests and woodlands will, during the progress of the war, continue to be the scenes of hard-fought engagements.

Wood Preserving Pointer

Recent experiments indicate that round timbers of all the pines, of Engelmann spruce, Douglas fir, tamarack, and western larch, can be readily treated with preservatives, but that the fir, hemlocks, redwood, and Sitka spruce, in the round, do not take treatment easily. This information should be of value to persons who contemplate preservative treatment of round posts, poles, or mine props.



FIRES

By BRISTOW ADAMS



The District Forester Speaks:

I wish I were out with the fellows—
 Just my luck to be stuck here in town;
 But I've got to sit tight when I'd heap rather fight
 To help keep these brush blazes down.
 I'm sick of this end of the business.
 The ring of the querulous phone,—
 The telegrams, too, of flames breaking anew
 While I have to stand it alone,
 And I'll own
 It's hell to be watching alone.

There's Bill—he's gone out with the pack train,
 And Jim—he's to rustle the grub
 For the men on the line, and he's doing it fine
 While I'm sitting here like a dub;
 The fellows are working like demons,
 They're scorched and they're blistered—no less,
 While I stay and chafe and am damnably safe
 When I'd like to mix up in the mess;
 Well, I guess!
 That the buck-brush ablaze is a mess!

In a swivel chair—well, it's the limit—
 With the rest in the thick of the fight
 With their lungs all a-choke with the dust and
 the smoke,
 And sweat in their eyes day and night;
 But I've got to look out for the labor—
 This calling for troops makes me sick;
 There's none seems to know if the troops ought
 to go;
 Neither begging nor blarney nor kick
 Brings 'em quick,
 So it's no use to blarney or kick.

So here I am pacing the office
 And "watchfully waiting" returns
 From lookouts for days all enveloped in haze
 Where half of a mountainside burns;
 I've drawn in my men to where danger
 Is worst where dry desert winds go,
 And I'll be in a hole if my extra patrol
 Can't hold in the face of a blow;
 And I know
 They *can't* hold in front of a blow.

I'm afraid there will be a hitch somewhere,
 There's no telling where it will be,
 But I'd rather be found right there on the ground—
 Right out there to think, act, and *see!*
I won't care for second-hand versions
 Of how the disaster befell,
 But I'll choose all the brunt of the scrap 'at' the
 front
 Instead of this telephone bell;
 And it's hell,
 To depend on this telephone bell!

Out there are my Supers and Rangers,
 With lumberjacks, men from the mills,
 From fields and from slums, hoboes, tie hacks,
 and bums,
 And ranchers who know all the hills;
 While I'm here with no smoke in my nostrils,
 I am here with no scorch on my cheek,
 When I'd rather be there with singed eye-brows
 and hair
 Than stuck in here week after week.
 Hear me speak!
 I'll be bughouse inside of a week!





Photo by Neal T. Childs.

TYPICAL MOUNTAIN MEADOW IN THE SIERRAS.

THIS IS AT AN ELEVATION OF 6,000 FEET. HERE IS THE GREENEST OF GRASS, THE RICHEST OF FORAGE, AN UNLOOKED-FOR BEAUTY SPOT IN THE HEAVY FOREST COVER.

THE MEADOWS OF THE SIERRA

By NEAL T. CHILDS

THE mountain meadows are the most distinctive feature of the Sierra landscape. They impress the new traveller the most, and the impression remains longest. The mental picture of countless mountain meadows lingers longer than the majestic quiet of Sequoia groves or the glint on the lofty granite needles of the High Sierra.

In the Rockies, the Cascades, and the Coast Ranges, the traveller is content with an occasional meadow; in the Sierras he depends on them. He may rein his horse from Tehachapi Pass on the south to Mt. Shasta on the north, a journey of five to seven hundred miles, and camp in a meadow every night, provided only that he keep above 3,000 feet.

The Sierra meadows vary in size from a grass plot the size of a respectable city lawn to areas covering two townships. Such a one is the great Monache Meadow at the head of the Kern River.

The Monache includes about 40,000 acres of grassland.

Some are quite regular in shape, being almost perfect circles or ovals cut in the forest canopy; others are irregular, with many grass arms or "stringers" running into the timber. These stringers usually follow gurgling brooks to their source in some springy swale.

So far no one has ever made a count of the meadows, though the Forest Service through its grazing and timber reconnaissance has a fair idea of the amount of grass land contained in the meadows on each National Forest.

To the easterner, the first mountain meadow is a distinct surprise. He walks his horse through the gloom of a heavy fir cover around a twist in the trail, through a thicket of saplings out into the bright sunlight lying on a lawn-like floor of the greenest of grass. The change from heavy tree trunks, purple shadows, and a brown carpet of needles is so abrupt that it startles one. Im-



Photo by Neal T. Childs

FATTENING BEEF STEERS ON A MOUNTAIN MEADOW.

HERE AT AN ELEVATION OF EIGHT THOUSAND FEET IS FOUND EXCELLENT FEEDING. THIS IS ONE OF THE MEADOWS OF THE SIERRAS ON WHICH THE FOREST IS CONSTANTLY ESCROACHING.

mediately he is seized with the desire to stop in this pleasant place. His horse is already cropping. He unsaddles and seeks out the brook which he knows must be running through the grass.

The meadows are the favorite camping place of the Sierra tourist. Here under the fringing Lodgepole pines he may pitch his tent, build his rock fireplace, and find abundant down wood. His tired and sweaty pack animals find rest and food, while the meadow stream furnishes water for the pot and often trout for the pan. So popular are certain meadows as camping places that the Forest Supervisor sets them aside for Tourist Pastures, the Government cooperating with the counties and recreation clubs in fencing them. Here the camper may for a number of days rest and feed his stock, while he enjoys camp life.

As grazing grounds mountain meadows are invaluable to the cattlemen. When the California sun has made the foothill pastures unbearable and the first lush grass of spring is gone, the cattle climb to the higher hills where the meadows furnish abundant food and water. Under the wise policy of the Forest Service these sky scraper

grazing grounds are proportioned out among the cattlemen. Each permittee has sufficient range for his cattle. For this privilege he pays perhaps sixty cents per head for the entire season. From April to September his cattle range through grass parks or over bushy slopes where tender browse is found. In addition he may for a moderate rental hold a "special use" on a mountain meadow. He may fence it, irrigate it, and enjoy complete use of it so long as he fulfills the simple requirements of a permittee. These fenced meadows where the grass is protected during the early summer make wonderful fattening pastures for the beef cattle. One often sees bands of splendid horses in these upland pastures. From a standpoint of beef and horse flesh, the mountain meadows are a very valuable asset to the California cattlemen.

At elevations below five thousand feet, mountain meadows, while of little value for grazing, often prove valuable for agriculture. The deep black silty loam produces excellent rye, corn, potatoes, and garden vegetables. If a little water can be led in from above, so much the better. One thing must be guarded against—rapid erosion of the



Photo by Neal T. Childs.

HORSES GRAZING IN A MOUNTAIN MEADOW.

FROM A STANDPOINT OF BEEF AND HORSE FLESH THESE MOUNTAIN MEADOWS ARE A VALUABLE ASSET TO SETTLERS AND CATTLEMEN.



Photo by Roscoe Parkinson.

A GLACIER LAKE—THE FORERUNNER OF A MOUNTAIN MEADOW.

THIS SMALL LAKE IS AT THE EXTREME HEAD OF TYNDALL CREEK GLACIER. IT IS ABOUT FOURTEEN FEET DEEP. THERE IS GOOD FORAGE A HALF MILE WEST OF HERE.



Photo by Neal T. Childs.

A WORN OUT MEADOW.

THIS IS NOW COVERED WITH SAGE BRUSH, JUNIPER AND YELLOW PINE. THIS IS A PROBLEM FOR THE FORESTER TO SOLVE. SHALL THE MEADOW BE IRRIGATED AND MAINTAINED AS GRAZING LAND, OR SHALL IT BE ALLOWED TO REVERT TO A FOREST AND BECOME A TIMBER PRODUCING UNIT?

soil by a meadow stream cutting back. This may be prevented, if taken early, by proper diversion, riprapping, and damming. The higher meadows will never be agricultural ground because of frequent frosts.

In addition to the cattle and horses that one sees in nearly every meadow, there is much wild life. Deer frequently graze along the marsh stringers in search of succulent plants. Occasionally a bear hunting ants or honey will blunder into a meadow. Of small mammals there are numbers, such as the woodchucks (ground bears), gophers, ground squirrels, and badgers who find good burrowing places in the soft soil. Grey squirrels, douglas squirrels, and chipmunks scamper about the edges of every meadow.

Of birds there are many, attracted by water and the abundant insect life that swarms in every meadow. Perhaps the most common bird is the Western robin. Robins in flocks of a half dozen or more hop about on these forest lawns as much at home as their eastern cousins in a well-kept park. Swallows are frequently seen skimming the surface of the larger meadows. The great grey marsh hawk finds good hunting

along the little swales of meadow brooks. The beautiful mountain quail are often seen trotting in and out of the scrub on the borders of the meadows, while a heterogeneous crowd of woodpeckers, creepers, warblers and other industrious entomologists flit among the fringing pines at the meadow's edge.

To the student of evolutionary geology and physiography, the mountain meadows are as a fascinating serial story. Each meadow is a chapter in that story that begins back in the Ice Age and comes down to the present day. One may lead his pack train over a trail of broken granite to some lonely cirque high on the shoulder of the great Sierra. There he may pitch his tent on a lichen floor close to a mountain tarn in which no fish swim and along whose shore an ancient wall of ice adds drop by drop its grudging toll of crystal water. This glacier lake over whose surface no birds skim or insects hum and whose stillness is as the stillness of the eternal, is the forerunner of a mountain meadow.

To prove the case, the traveller may drop down a thousand feet and tramp over a springy lichen-covered bog, once the bed of a glacier lake. Further down



Photo by W. S. Morroa.

MONETTA LAKE IN THE SIERRAS.

ON THE FAR SIDE OF THIS GLACIER LAKE ARE SEEN FOXTAIL PINE, WHILE THE SHORES ARE FRINGED BY SEDGES. THE ABUNDANT INSECT LIFE HERE ATTRACTS WESTERN ROBINS AND SWALLOWS. THERE IS GOOD MEADOW NEAR. THE LAKE WAS SUPPOSED TO HAVE BEEN STOCKED WITH GOLDEN TROUT IN 1910 BY S. N. ELLIS BUT NONE WERE FOUND WHEN THIS PHOTOGRAPH WAS TAKEN SEPT. 12, 1912.



Photo by Neal T. Childs.

A MEADOW REVERTING TO A FOREST.

HERE THE MEADOW HAS GONE FAR TOWARD BECOMING A PORTION OF THE SURROUNDING FOREST AND IS NOW WELL COVERED WITH A NATURAL SEEDLING OF JEFFREY PINE.

he will come into a meadow where lichens give place to sedges, but along its lower borders he will find the tell-tale marks deep in the granite where the ice slipped over the saucerlike brim of what was once a glacier lake. Perhaps only stunted foxtail pine or white barked pine fringe its border and frost is here every night in the year, but the succession is plain till he reaches a level of eight to nine thousand feet when he comes to a normal meadow lush with grass and spangled with flowers. White Fir, Red Fir, and Sugar Pine come down its borders, and cattle munch knee deep in content, but along its rim lie the shells of mussels that lived in the ancient lake now long gone.

Nor is the evolution complete. Still the meadows change. You will find meadows that are changing today, meadows that have gone dry, as the mountaineer says. When the water level is lowered owing to erosion or other cause, the grass in a meadow gives way to other vegetation. Sage brush generally is the first intruder. This in turn is followed by a sprinkling of mountain juniper (*J. occidentalis*), and lastly by Yellow Pine and Incense Cedar. There are many meadows in the Sierras today which are quite

rapidly reverting to the forest. Thrifty stands of pine and cedar are found where only grass cover was known.

It is in these "worn-out meadows" that the forester has a problem to solve. Shall the meadow be irrigated and maintained as grazing land or shall it be allowed to revert to the forest and become a timber producing unit? Here is a nice problem for the forest student who is interested in land values.

To the average citizen, however, it is as a natural feature that the mountain meadow will always be of chief interest. Coupled with their natural beauty there is also a thread of romance that appeals to the traveller. Once the grazing lands of the Spaniard where the herds of the great haciendas roamed at will in the far-off times before the Gringo came, the mountain meadows hold in their names some of the charm of the halcyon days. Such names as Albinita, Paloma, Bonita (pretty little place), Casa Viejo—musical names whose charm lingers like the morning mist over meadows and in these Anglo-Saxon days of grazing fees and water-power sites keep for the tourist high in the Sierra fastnesses a whisper of the romance of life in Old California.

THE REDWOOD OF CALIFORNIA

By J. H. BROWNE

THE opening of the Panama Canal and the completion of the Northwestern Pacific Railroad into Humboldt County, California, will mean more to the Redwood industry than anything since the manufacture of Redwood began. With the canal, will come the opportunity of marketing Redwood throughout the world in parcel lots of 25, 50 or 100,000 feet; where, heretofore, it has been necessary to sell in cargo lots of 1,000,000 feet or more to obtain advantageous freight rates. Direct rail connection with the mills in Humboldt County means a saving of from \$2.00 to \$5.00 per M in the cost of making Eastern Redwood shipments. This will assure the mills a better return on such of their product as is now being shipped East, and will enable them to market a large quantity of by-products which are now burnt up or sold at cost locally.

The market for Redwood was for many years uncertain and limited, its sale depending chiefly upon the California demand. The development of the Eastern and foreign business was slow, because there was no direct rail connection with the Redwood country, it being necessary to bring all shipments into the harbors of San Francisco or Los Angeles for reshipment.

The earliest logging of Redwood forests was by the Spaniards near San Francisco Bay, but their operations were very small. At the beginning of the nineteenth century, a Russian colony near Fort Ross in Mendocino County, cleared a tract of Redwood which has since grown up and again been cut over. It was not until 1850, however, that small sawmills were started at various points along the coast. These have grown until there are now eighteen or twenty more of the important mills in operation with a total annual output of 550,000,000 to 600,000,000 feet.

The biggest stands of Redwood timber are in Del Norte, Humboldt and Mendocino Counties, but there are isolated groups as far north as the Chetco River in Curry County, Oregon, and as far south as the Santa Lucia Mountains, Monterey County. The Redwood belt is from twenty to forty miles wide, the trees growing on the west slopes of the coast range.

The enormous height and diameter of the Redwood is due to the great rainfall in the autumn and winter, from thirty to sixty inches, and to the sea fogs which bathe the coast in the summer. There are two types of the Redwood, those which grow on the slopes and those on the flats or bottom lands. The Redwood slope is the common type, and it grows mixed with other woods such as Red Fir, Tan Bark Oak and White Fir. As the slopes become moderate, the altitude lower, the soil deeper and the water supply better, the Redwood steadily gains on the other species until on the rich flats there is no other tree. The extreme form of the Redwood flat is along the Eel river, and here the trees attain their greatest known height and clear length. Under best conditions these trees grow to be 350 feet high with a diameter of twenty feet. Most of the Redwoods cut are from 400 to 800 years old, and the oldest tree found during the Government investigation in 1900 was 1373 years old. The tree when normal has a straight, slightly tapered bole clear for more than 100 feet, and a crown of horizontal branches that may occupy from one third to one-half of its total length.

The enemies of Redwood are few and it suffers from them less than other trees. The wind can scarcely uproot it, insects seem to do it little harm, and fungi seldom affects it. Even fire, the great enemy of all trees, though it may occasionally kill whole stands of young Redwood growth, is unable to penetrate



WHERE SHADOWS ARE DEEP.

THE ROAD AFTER WINDING THROUGH A REDWOOD FOREST WHERE THE TREES ARE SO THICK THAT THERE IS LITTLE SUNSHINE SUDDENLY TURNS INTO AN OPEN SPACE WHERE THE SUNSHINE IS STARTLINGLY VIVID.

the fireproof sheathing of shaggy bark with which the old trees protect themselves.

The yield of the Redwood will average from 75,000 to 85,000 board feet per acre, but some of the flat lands will show a stand of 1,000,000 feet or more to the acre. It is estimated that there is standing today about 75,000, 000,000 feet of merchantable Redwood timber, so that at the present rate of production there is more than a century's supply to look forward to. The value of the stumpage varies from \$1.50 to \$5.00 per M feet, depending upon the character of the timber and its location and accessibility. The flat timber is less expensive to log, and produces a greater amount of the upper grades. Redwood lumbering is expensive and difficult. The average cost is \$5.00 to \$6.00 per M. On the flat lands it will go as low as \$3.00 per M. The greatest care must be taken by the choppers in felling a tree so that it will strike throughout most of its length at the same time, otherwise the wood will break and splinter badly. After the choppers have done their work, the bark is peeled and the tree cut into lengths from 16 to 40 feet. Skid roads are constructed over which the logs are hauled to the landings and loaded on cars by donkey engines on their way to the sawmills.

The cost of converting Redwood logs into lumber is from \$2.50 to \$3.00 per M, this cost being increased because of the waste in manufacture, and because of the large amount of small sizes which the market calls for. Some logs are so large that they have to be split before the carriage will handle them in the mills. All machinery must be of the heaviest in order to stand the strain.

In this country Redwood is used very largely for exterior finish. It is particularly valuable for this sort of work because of its lasting qualities and its resistance to fire. Redwood contains a peculiar acid which preserves the wood. Many examples can be given of buildings sided with Redwood boards and covered with Redwood shingles that are today in first-class condition after fifty or sixty years of continuous use without paint or treatment of any kind. Redwood contains no pitch of any kind, will not ignite easily, burns very slowly and absorbs moisture readily, making it easy to put out a fire. After the great San Francisco earthquake and fire in April, 1906, the Building Committee appointed by the Mayor to determine the character of buildings and materials to be used in constructing same, adopted the following resolution:

"RESOLVED that no permits will be given at the present time for the construction of any buildings in San Francisco, but owners of property will be allowed to proceed and erect upon their premises temporary one-story buildings constructed of galvanized iron or Redwood, without a permit."

The United States Government has compiled a list of woods designating the degree of inflammability by the position on the list. Redwood heads this list.

Redwood is also peculiarly fitted for the better class of interior finishing. The natural grain of the wood is beautiful, so that it is not necessary to select special pieces in order to obtain a handsome effect. It is easily worked and takes a beautiful polish. When the wood is once properly dried, it will not shrink or swell, there-



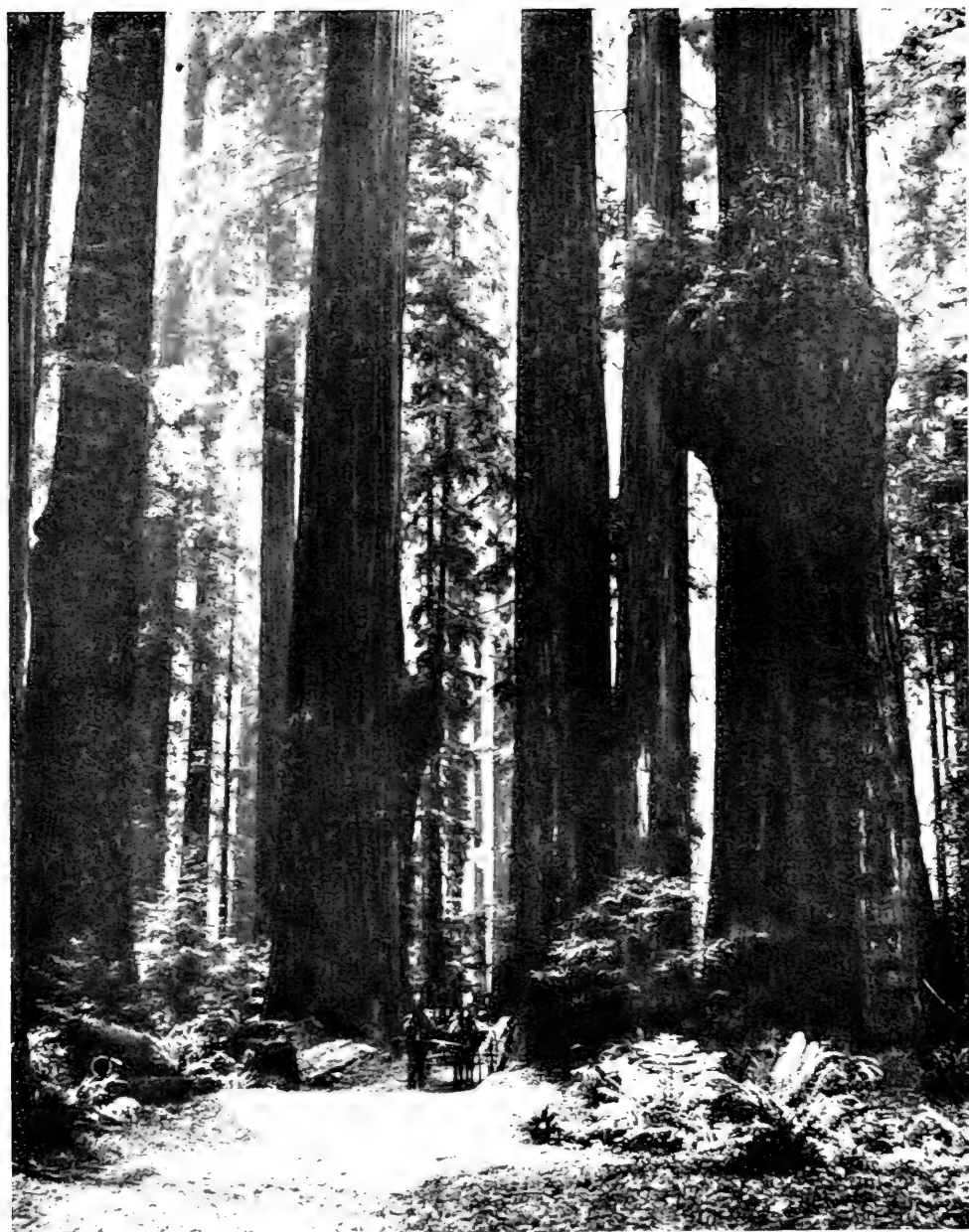
DEEP IN THE REDWOODS.

A TYPICAL SCENE AMONG THE BEAUTIFUL TREES WHERE JOURNEYING IS ALWAYS A SOURCE OF WONDER AND DELIGHT.



A TYPICAL REDWOOD.

THIS SHOWS NOT ONLY THE SIZE OF THE REDWOOD BUT THE NATURE OF THE LUXURIANT UNDERGROWTH FOUND IN THE REDWOOD FORESTS.



GOOD ROADS GIVE THE JOY OF TRAVELING THROUGH THE HEART OF THE REDWOOD FORESTS AND THOUSANDS OF TOURISTS TAKE THE TRIP



NEAR THE SISKIYOU NATIONAL FOREST.

THE TYPE OF REDWOOD ADJACENT TO THIS NATIONAL FOREST IN CALIFORNIA. NOTE THE MAN STANDING AT THE BASE OF THE LARGEST TRUNK.

fore, there will be no unsightly cracks to fill up after a few years of use.

Redwood is used for doors, sash, columns, window frames, mouldings, porch rail and balusters, lattice; in fact, for all kinds of exterior and interior work. There are various kinds of special work for which Redwood's peculiar qualities are fitted such as incubators, beehives, pattern stock, tank, pipe and silo staves, cores for

vencer work, caskets and casket boxes. In addition to the uses for the upper grades mentioned, the lower grades of Redwood are used for all kinds of foundation work, irrigation work, as well as railway ties and tunnel timbers. Redwood is not only valuable for these purposes because of its durability and freedom from decay or rot, but also because it is not susceptible to the attacks of insects, such as the white

ant that destroys other soft and hardwoods.

Notwithstanding the handicaps that have existed in connection with the marketing of Redwood in the East, the present volume of Eastern shipments is now about 75,000,000 feet annually. This stock is distributed in practically every state, except those in the extreme south, from Colorado to Maine. While Redwood is extremely heavy when it is first cut, it dries out very light so that it may be advantageously shipped East on high rates of freight in competition with other woods. The foreign market takes even greater quantities of Redwood than the Eastern market. Australia and the United Kingdom are the largest consumers of the upper grades, while the west coast of South America, India, China, the Philippine and Hawaiian Islands use quantities of Redwood ties. Smaller shipments of Redwood have been made to the east coast of South America, France, Germany and South Africa. Earlier shipments of Clear Redwood to Australia and Great Britain were largely heavy plank in the green state. Recently both of these countries have begun to realize the advantage of purchasing seasoned material in the sizes that are actually going to be used, and as many of the mills are

now equipped to handle seasoned stock in large quantities, the volume of business has been considerably increased. Australia has already ordered 50,000,000 feet of Clear Redwood in 1914.

The problem of drying Redwood properly has been a serious one because of the large amount of moisture the wood contains. Earlier shipments of kiln-dried material did not give satisfaction because of the stock being dried too quickly, or too much, leaving the wood brittle and likely to split. Now the manufacturers realize that the best method of artificial drying is the one that approaches most nearly the natural air-drying, namely, a low heat with a big circulation of air to carry off the moisture.

The ability to furnish seasoned Redwood in large quantities will undoubtedly open new markets throughout the world, and with the improved conditions for marketing their products, because of the Panama Canal and the Northwestern Pacific Railroad, the Redwood manufacturers of California are looking forward to a period of prosperity that will increase by leaps and bounds as the true worth of their wood is recognized in a greater degree.

AN EFFECTIVE FORESTRY EXHIBIT

NEW JERSEY made an exhibit at the Trenton Interstate Fair which appears to have gone a long way toward presenting the aims and methods of forestry to the people, especially to the farmers, who may be interested as woodland owners.

The Trenton Fair, held annually at the end of September, usually attracts upwards of 150,000 people from all over New Jersey and eastern Pennsylvania. A very large proportion of them are farmers who seek information as well as amusement.

The forestry exhibit was established on a lot 55 feet by 100 feet surrounded by an old-fashioned post and rail fence

made of blight-killed chestnut. Telling placards showed that this fence compared favorably in cost and in durability with any of the modern forms. The central feature within the enclosure was a slab cabin 20 feet by 25 feet in which were exhibited large pictures of forest operations, a collection of forestry tools, etc. Outside the cabin were displayed various local forest products, each labeled in a way to show the visitor its value as a forest product apart from its worth as merchandise. A special effort was made to label everything shown in a way to convey the sort of information that a visitor was most



A STATE FAIR EXHIBIT.

THE STATE FORESTRY DEPARTMENT HEADQUARTERS AT THE NEW JERSEY STATE FAIR AT TRENTON IN SEPTEMBER.

likely to want. Other portions of the space were devoted to practical exhibits of forest planting and planting material, to demonstrations of how to doctor and care for trees, and of the damage done by forest fires.

In all parts of the exhibit stress, repeated and emphasized in various ways, was laid upon the fact that forestry of any kind depends absolutely upon the control of forest fires.

The state fire service was represented by the State Fire warden and a Division

Fire warden who talked with the people constantly. The physical means of controlling fires were shown in a collection of fire-fighting apparatus.

The exhibit attracted much attention. At times the space was crowded, and the three attendants had all they could do to answer inquiries. It is estimated that not less than 15,000 people visited the exhibit during the five days that the fair continued; most of them carried away some kind of printed matter.

Forestry on King's Estate

The King of England has given permission to have a part of the royal estate placed at the disposal of the school of forestry at Cambridge University for purposes of experiment and demonstration.

Penn for Forest Conservation

William Penn, in his Charter of Rights, provided that for every five acres of forest cleared one acre should be left in woods. Foresters today maintain that on an average one-fifth of every farm should be in timber.

Rangers Posting Signs

Throughout the national forests the rangers are posting the roads with permanent guide signs which tell distances and directions, especially at forks and cross roads. The signs are usually put up in the winter when other work tends to be light. On some forests the rangers go on snowshoes, dragging loaded sleds, and nail the signboards to the roadside trees.

WOOD PULP FOR SAUSAGE CASING

SAUSAGES are now being put in casings made from wood pulp instead of the time-honored intestinal casings, and it is said these wood casings are more sanitary and more serviceable than the old style.

The description of how they are made is written for AMERICAN FORESTRY by G. P. Cohoe, chemist for the William Davies Company, of Toronto, Canada, which uses them. Mr. Cohoe writes:

This sausage casing is made of the best quality bleached sulphide wood pulp. The wood pulp is put in solution by any of the well-known methods, which have been in use for a number of years. In practice we use the well-known Viscose reaction, which has been found to be the most economical and easiest of operation. The Viscose when made is stored in containers for the proper length of time, when it is ready for the manufacture into tubes. I cannot give you any information with regard to the method of manufacturing tubes, inasmuch as we have patents pending, and a further disclosure is impossible under these circumstances. The Viscose is made into thin walled tubes, which vary in diameter, according to the uses to which they are finally put. The length of these tubes vary with the skill of the operator. It is quite common in shop practice to get tubes varying from 500 to 600 feet in length. When these tubes are once made, they are reverted, and the impurities resulting from their reversion are washed out, and the result is that at the end there is produced a clear, transparent, colorless tube of pure cellulose. This cellulose is without fibre, and entirely without seam or joint, which differs from cellulose tubes made by any other

manner. They are finished in a dry state, but are usually conditioned, so that the cellulose does not become hard and brittle as it dries. In this dry state the tubes are cut to suitable lengths, and prepared for the trade.

From a sanitary standpoint, this product presents several noted advantages, which are freedom from disease, cleanliness of the process of manufacture, and absolute antiseptic properties of the final product. It also presents the very valuable property of keeping indefinitely in its dry state, and not being subject to any kind of putrefaction.

From a sausage maker's standpoint, the properties which appeal to the sausage maker are the elasticity of the product, which enables it to expand when the product is filled into it by means of the ordinary filling machine. It also has the requisite strength to enable the sausage to be filled by the ordinary workman, and it is strong enough to stand the subsequent process of handling, cooking and hanging. The casing cuts, as does an ordinary casing, peeling off rather more readily from the meat than does the intestinal casing. Unlike the intestinal casing, it is of uniform diameter throughout its whole length, and thus presents to the purchaser of the sausage a better appearance than is the case with the usual casing. It is also uniform, and does not present the bundles of fibres that are common with the intestinal casing. In the past the sausage maker has had to take the sizes of sausage casing which nature presented to him. In this casing, however, it is possible to produce any size which may be desired for the various purposes of the sausage manufacturer.

Pennsylvania's Standing

According to the latest available figures, Pennsylvania stands fifth in the production of wood pulp and is second to West Virginia in the amount of slabs and other sawmill waste used for pulp; Maine stands third.

BALTIMORE'S SHADE TREES

By R. BROOKE MAXWELL, *City Forester*

THE first efforts made by the city of Baltimore toward the systematic planting of shade trees on the public footways were made by the Park Commissioners. The Commissioners of a decade or so ago conceived an idea that systematic tree planting should be extended to include public footways. At this time there were no ordinances authorizing the planting of trees on public footways, and it was necessary for the Park Commissioners to make a canvass of the street on which they intended to plant, and ask permission of the property owners to place trees on the footway. Several streets were planted in this manner, and because of the personal

whims of the property owners the planting could not be done systematically. The plantations, therefore, in many cases presented a ragged appearance. After the trees were established the Park Department being handicapped by lack of legal support was not able to give the necessary oversight, and to carry on the cultural operations. The trees were therefore abused, some of them removed, and the work of the Park Commissioners in general was not successful.

Baltimore gradually came to realize the fact that the shade trees of the city were real city assets, the proper care of which required a technical municipal organization or department just as care



CENTER PARKING, MT. ROYAL AVENUE, BALTIMORE.

SHOWING A PLANTING OF ORIENTAL PLANES. THESE TREES HAVE ALWAYS BEEN UNDER THE CONTROL OF THE DEPARTMENT OF PARKS



PARKWOOD AVENUE, BALTIMORE.

THIS STREET WAS PARKED AND PLANTED BY THE DIVISION OF FORESTRY AS A PART OF IMPROVED PAVING WORK, THE PLANTING OF NORWAYS TAKING THE PLACE OF UNDESIRABLE POPLARS.

of the sewers or streets required such an organization. The Division of Forestry was therefore established as a Division of the City Engineer's Department. Supported by a broad comprehensive tree law, the city's tree problem is now under charge of an organized Division which has absolute control over all shade trees growing on public footways. The present organization of the Division consists of a Forester, Assistant Forester, Inspector of parking work, Clerk, three (3) gangs of laborers with a foreman over each. The present appropriation for tree work in the city is \$7,900, an amount entirely inadequate for the proper handling of the tree problem.

The Forestry Division is called upon to do a large amount of parking work for the Annex Improvement Commission as a part of improved paving work, and it is only because of this work that the above personnel can be maintained.

When active work began in March, 1913, an inventory of conditions revealed that Baltimore was not a tree-

less city by any means, for it was found that 75,000 trees (estimated) were standing on the streets of the city proper and the Annex. These trees for the most part were planted by real estate developers and property owners who were poorly versed in the value of species and the technique of planting. Present conditions indicate that quickness of results and not permanency of tree values was sought for. As a consequence we find a preponderance of the quick-growing short-lived trees. Common among these are the North Carolina poplar and the Silver Maple. At least 75% of the trees are of undesirable species, most of them being improperly planted. The commonest faults in the planting are too close spacing, planting too near the curbing, and failure to protect the trees. This last fault in the planting is directly responsible for the decadent condition of possibly 25% of the mature trees. The growth of the mature trees which are now standing on the city's footways was made possible only by very favor-



CENTER PARKING, EUTAW PLACE, SOUTH OF NORTH AVENUE, BALTIMORE.
THESE TREES HAVE ALWAYS BEEN UNDER THE CONTROL OF THE DEPARTMENT OF PARKS.



STRIKING EXAMPLE OF THE NEED OF MUNICIPAL CONTROL.

A ROW OF SUGAR MAPLES ON EUTAW PLACE, BALTIMORE, KILLED BY IMPROPER "HEADING BACK." THIS WORK WAS DONE TO DISPLAY THE NEW HOUSES.

able factors of growth and not to the exercise of tree culture. When these trees were planted the streets were of cobble, the footways of brick, and surface drainage common. The introduction of new paving materials for both road-bed and footways and underground drainage makes the successful growth of shade trees on the streets possible now only through the practice of intensive arboriculture. Baltimore

ideal, because the inspectors are versed only in the legal phase of the subject.

The classes of work carried on by the Division are the ordinary ones of planting, pruning, spraying, removing and tree repair. All work is done from a single working centre which, while somewhat remote from certain points of the city, is centrally located with respect to the "tree area." A large compost and soil heap, a "heeling in"



ARCHITECTURE COMMON TO BALTIMORE.

NOTE THE SMALL PLANTING SPACES ON THE NARROW CEMENT FOOTWAY. THIS IS NOW PREVENTED BY THE OFFICE OF TREES, AND MUCH LARGER PLANTING SPACES ARE REQUIRED.

is characteristically a city of narrow footways and solid blocks of houses, factors which make the solution of the tree problem difficult. The conspicuous absence of front lawns or grass plots, and the increasing of cement footways and asphalt roadways adds greatly to the difficulty of growing shade trees on the footways.

The provisions of Baltimore's shade tree laws are carried out through the City Forester's office by means of the permit system using the city's patrolmen as the inspectors. This plan is not

ground, and a repair shop are valuable divisions of the working center.

The present scheme of planting on the footways of the city provides for the planting of public thoroughfares (not business streets) and drives first. Such a system of planting reaches the greatest possible number of people. The placing of trees on streets other than those mentioned will have to come later unless the work is paid for by the benefited property owners. 1,795 trees of the standard street species were planted during the first year of work.

Pruning work is distributed much as the planting work is, except where dangerous or urgent conditions exist. Large numbers of the mature trees are suffering from "stag-headedness," abrasions caused by electric wires, etc. These conditions are being improved as rapidly as funds will permit. 2,500 trees were pruned during the first winter, and about 500 removed.

Baltimore is fortunate in being comparatively free from the ravages of dangerous boring insects. Infestations of the leaf eating and several scale insects are common, however. Of the former the tussock moth and the bag worm are most serious. The elm leaf beetle is found only in small numbers and is easily controlled. During the present summer the attacks of the tussock moth were unusually severe and thousands of trees were entirely defoliated. The silver maple and the American linden suffered most. The North Carolina poplar is supposed to be a harbor for the tussock moth, but experience gained during the present summer leads the writer to believe that the species is more nearly immune from the attacks of the leaf eaters than either of the lindens (European and American) or the Oriental Plane.

The oyster shell and black banded lecanium scales are the commonest of the sucking insects. The former is common on the silver maples and the latter on the planes. Every possible effort is being made with the funds at hand to control the insect situation. The plan of offering a bonus to children for the collection of moth eggs has been inaugurated and should be productive of good results.

Very little cavity work or tree repair is carried on by the Division. In general it is found that where a tree is sufficiently decadent to require the expenditure of a large sum of money for cavity repair the money is better spent in establishing several young trees.

A field of service where the Division of Forestry is of especial value to property owners is in the supervision of tree

trimming work done by public service corporations. Wherever it is necessary for a company operating overhead wires to prune trees in order to keep their circuits open this work is carefully directed and supervised by the



TREE SURGICAL WORK BY THE BALTIMORE FORESTRY DEPARTMENT.

THIS TREE IS STANDING AT THE PLACE WHERE CHARLES CARROLL OF CARROLLTON WAS BORN. THE PROPERTY IS NOW OWNED BY THE CITY.

office of trees. A small source of revenue is realized from this work.

A shade tree nursery is being developed by the city on a portion of its water shed area at Loch Raven, Md. 7,500 desirable street trees of various ages and sizes are now growing in this nursery.

A TRIP FOR REINDEER

By ARNOLD HANSSEN

IN THE month of July I was sent by the Laurentide Co., Ltd., of Grand Mere, Que., to bring a shipment of reindeer from Newfoundland to Quebec. By the courtesy of the Department of Marine and Fisheries of the Dominion Government we were allowed to transport the deer on one of their steamers which was making the trip to coal and provision the light-houses and telegraph stations. The deer were purchased from the Grenfel International Association and were at their station on the peninsula between Ha Ha and Pistolet Bays on the northern coast of Newfoundland. This peninsula, swept by the winds from the north Atlantic, is mostly barren rocks, covered with the white reindeer moss,

except in the low sheltered places, where there is dense small spruce, twisted by the winds.

I left Quebec late in July on the Government Steamship *Montmagny*, which has since been sunk by collision with a collier in almost the same manner as the ill-fated *Empress of Ireland*. On the fifth of August we arrived at Cape Norman about ten miles from Ha Ha Bay, when we received a message telling us that war had broken out and that as there were two German cruisers in the Gulf of St. Lawrence, we must return at once to Quebec. I was much disappointed at being so near our destination and unable to get the deer.

Fortunately a couple of days later we met the Government S. S. *Mont-*



DOMINION GOVERNMENT SS. "MONTMAGNY" IN AN ICE FIELD.

THIS BOAT, WHICH TRANSPORTED THE REINDEER, HAS SINCE BEEN SUNK AS THE RESULT OF A COLLISION IN ALMOST THE SAME MANNER AS THE ILL-FATED EMPRESS OF IRELAND.



THE MAIN HERD OF REINDEER.

THESE BELONG TO THE GRENFEL INTERNATIONAL ASSOCIATION AND ARE HERDED ON THE PENINSULA BETWEEN HA HA AND PISTOLET BAYS ON THE NORTHERN COAST OF NEWFOUNDLAND.

calm which was on her way to Labrador and would touch at Ha Ha Bay and I accordingly transferred to her, and about ten days later dropped anchor at Ha Ha.

We expected to find the deer in a corral all ready for us but found instead that they were somewheres in the mountains and that the herders had gone to St. Anthony, leaving no orders about our consignment. There was only one man left and as we wanted the animals at once he said he would drive them in without delay and declined the help of the fifteen sailors kindly offered by the Captain.

We waited, expecting soon to see a stately procession of reindeer marching dignified into the inclosure: we waited one hour, we waited two hours and then it commenced to rain. After four hours, when the men had all gone back to the ship, except the purser and myself, the man returned saying that

the animals were quite content where they were and refused to be driven in.

We thought that as we should have to wait for the herders to come back, we might as well see something of the country and perhaps get some pictures of the deer in the open. So we started across the peninsula and then followed up the other shore and after a short time sighted three deer, their silhouettes easy to distinguish against the dull sky. As soon as they noticed us and had a good look, they seemed to think that we were worse than we appeared and cantered over the ridge more like wild caribou than domesticated reindeer. This first sight made us eager for another, so we followed them through a patch of dripping spruce which wet us to the skin, to the barren rocks where the going was easy.

For half an hour we saw no more, then suddenly came across three lying down in a small bog. When they



LASSOOING A REINDEER.

AFTER STRENUOUS WORK THE REINDEER WERE DRIVEN INTO A CORRAL WHERE THE HERDERS EASILY LASSOED THEM.

scented us they started off, but by walking slowly and well off to the sides we cut them off and got them started toward the corral. A little later we saw fifteen more, somewhat to one side, but by making a detour we had no difficulty in getting them to join the first three. With the increase in numbers the deer went along more quietly and confidently, but we had to sprint now and then to keep a certain doe where we wanted her but where she did not want to stay. She appeared to be quite a leader, which seemed funny to us as we thought the bucks always played this rôle, but perhaps the suffragette movement has begun to reach the animal kingdom also.

As long as we could steer that doe towards the corral, we did not need to give much attention to the others, who followed her everywhere, but she certainly kept us busy at times. Rounding a corner of a cliff, we came upon the main body of the herd, about 400 deer, feeding around a small pond in the rocks.

They started to grunt when they saw us, but showed no signs of fear, so we had a pretty easy task driving them towards the landing place, close to which we met the herders, who had just returned, and where we also had the aid of the sailors from the ship.

The great number of men seemed to make the deer uneasy, and they tried to break away, but we had them pretty well cornered and after half an hour's running at top speed to keep them together, got about two hundred inside the corral where the herders started to lasso those picked for shipping. The lassoing itself was easy compared with the handling of the captured deer, who fought with front and hind legs, as long as they had a foot free. This made it necessary to tie their feet up. We tried the crate cases but without success.

On board the ship they were put into pens 15 x 15 feet, 6 deer in each, and although we had rough weather for several days, with the sea washing over



PUTTING REINDEER ON BOARD THE BOATS.

SO VIGOROUSLY DID THE REINDEER FIGHT THAT IT WAS NECESSARY TO TIE THEIR LEGS TOGETHER AND THUS RENDERED HELPLESS THEY WERE CARRIED ON BOARD.



REINDEER IN THE CORRAL OF THE LAURENTIDE COMPANY.

THEY WILL BE SOON TRAINED TO HARNESS AND USED FOR SLED WORK AT SOME OF THE COMPANY'S WINTER PLANTS.

the steamer, they did not suffer at all, but arrived in Quebec after a ten days' voyage in fine condition. They were taken out of the steamer's hold in crates about eight feet long by four feet wide by five feet high, four to a crate, and driven to the railway where they were placed loose in a box car, and arrived at their destination in good shape. There

they were placed in inclosed pieces of woodland where there is plenty of browse and some pasture and are now fat and sleek. They are just commencing to lose the velvet from their horns, and as soon as the rut is over the training to harness will commence. They will be used for sled work at some of the lumber camps of the company.

FENCE OFF WOODLOTS

THE importance of fencing off from cattle a woodlot on each farm now being cleared in northern Wisconsin has been emphasized recently by representatives both of the Wisconsin State Forester's office and of the United States Forest Service. F. G. Wilson, of the State service at Madison, accompanied by Benton Mackaye, a member of the National Forest Service at Washington, have been examining the woodland in that vicinity of northern Wisconsin.

"The one essential need in preserving the woodland in this country," said Mr. Wilson, "is to have a woodlot, free from cattle, of ten or twenty acres on each farm. No farm is complete without a woodlot. Every good farmer, of course, knows this. It is needed, not only for firewood and building material, but also for the yield in dollars and cents which it will bring. The pioneers of northern Wisconsin are people who look ahead. They are right now building homes, not alone for themselves, but for their children. The wood crop is slow, but it is sure; and, unlike other crops, it needs very little cultivation.

But there is one thing that the woodlot needs right off, and that is a fence

around it. A permanent woodlot needs young trees growing up quite as much as growing stock needs feed. I understand perfectly well that cattle need tree shade. Let them have it. But they don't need all the shade there is. Don't fence off all your woodland; fence off ten acres on every forty and let the cattle run through the rest of it. There should be enough trees left in the pasture to shade the cattle just as there should be enough trees left around the house to shade the folks. And in addition to these trees, there should be a woodlot, where there is 'no trespassing' for cattle.

"A woodlot of about 20 acres on each 80-acre farm will add many dollars in value to that farm in future years.

"The pioneer seems to have one main idea in mind—to clear the land. He forgets to leave the very thing that later he will work hard to get back. Here is where the pioneer has his chance over the established farmer. If he would only concentrate his clearing on four-fifths of his farm—clear that well and simply protect the rest as a woodlot—he would then be making a complete home and outfit for his family instead of an incomplete one."

Wood for Handles

As many as 72 different kinds of wood are used in the manufacture of umbrella handles, canes and whips in this country.

Cinders Carried Twenty Miles

Authentic records show that cinders, from a forest fire in the tree tops in northern Washington this fall, were carried a distance of twenty miles.

THE EARLY LOGGER IN THE SIERRAS

By ALEXANDER W. DODGE, Deputy State Forester of California

DURING the winter months, when, in Maine, the lumberjack is straining his peavy and cross-hauling the logs onto his bobsleds, his brother, the western logger, is not so fortunate. The latter will doubtless be found, together with many others like him, either ornamenting the entrance to some city employment agency discussing at length and to no purpose the great issues of the day or "goin' south" on the first "safe catch" that leaves the railroad yards. The man of the logging camps in the California Sierras is, perhaps of necessity, a transient. He is often a traveler whose destination is anywhere and nowhere in particular; whose ticket is apt

to be both invalid and unlimited; at whose station no one awaits him unless it be a "cop"; whose meals are delicious, irregular and hard to get; and whose baggage consists of no more than one man can carry. The majority of these men who follow logging operations would gladly remain in the woods permanently, since every day adds, on an average, two dollars to each individual "stake."

However, not long after the beginning of November the first snow lightly covers the forest and the mornings are likely to be sullen and grey. The tent flies strain slightly under the gentle weight of the powdery herald of winter and immediately there is talk of closing



A LOGGING TRAIN.

LOGGING THROUGHOUT THE SUMMER MUST BEAR ITS SHARE OF THE EXPENSE OF PREPARATORY WORK IN THE SPRING.



THE LOG POND.

LATE IN THE SEASON SPECIAL ATTENTION IS GIVEN TO FILLING THE LOG POND AT THE MILL TO PROVIDE FOR A BUSY WINTER'S WORK.

the camps. Just before this time the mill cut is materially reduced and special attention is given to filling the log pond. So, when the shrill whistle of the donkey engine in the woods toots its last "pull-her-in" signal, the log pond is generally full and logs are decked high on the banks. This supply of logs will enable the mill to begin cutting before the woods are opened up the following Spring. The camps close down and outgoing trains are loaded with men bound for town. To almost every man will come a new suit, a hat and new pair of shoes, a week of bright lights and player-pianos, a good time and then, unfortunately, to many of them, a long winter of existence by this means or that.

Soon after the closing of the camps the mill shuts down and the jackladder chain gets rusty again. The Sierras are silent during these months—usually from the first of December to the latter part of March—silent and deserted save for the lone trapper or prospector who decides to breast the heavy mountain storms. In his solitary fight against the cold he takes pleasure in counting

the days until the time when his departed friends, the lumbermen, will return; to the time when the camps will open again and the scent of logging will fill the summer air; to the days when credit will be given at the camp commissary; and to the clear summer nights when the gang around the camp-fire will listen intently to his tales of the winter's adventures.

Some winters in California are less severe than others; but, it is not safe to count upon a light annual snowfall until Spring actually comes. Heavy snow storms occur in the Sierras and well below the timber-line, not infrequently, as late as the middle of April. Spring comes and clear weather enables the farmers in the valleys to cultivate the soil and plant their early crops; but, the lumbermen in the Sierras still wait for the deep snow to disappear. In some sections the lumberman is indeed fortunate who is able to resume operations by the middle of March. The nature of methods employed in western logging render early operations difficult. Power logging requires the manipulation of extremely heavy machinery and



THE FIRST CREW BREAKING THE TRAIL TO THE CAMPS.



THE WRECK OF THE COOK HOUSE.

TIRED OF ITS WINTER BURDEN THE COOK HOUSE GAVE WAY UNDER THE WEIGHT OF SNOW ON ITS ROOF AND HAD TO BE RECONSTRUCTED.

this cannot be successfully accomplished when there is a material depth of snow on the ground.

A large company operates a mill of 250,000 feet daily output at Stirling City, in the Sierras of Butte County. This company, not unlike several others

During the early Spring of 1913 it was my opportunity to become familiar with the difficulties encountered when an attempt is made to "begin early" in a Sierra logging camp. Seven camps supplied the Stirling City mill with logs and all these camps were buried in snow and at a great distance from the mill. The winter had been severe and heavy snow storms continued until about the first of April. Clear weather in the valleys below prior to this date had turned the toes of many a waiting lumberjack toward the hills. In their hearts they could hear the thud of the great pines, the sing of the buckers' saw, the familiar shrill whistle from the donkey engines, the triangle gong which rings to the beat of the "chink's" flunky; and the vision of a table loaded with real things to eat came before them—all this recollection awakened a longing to return, and the man without a job came back.

On April first there were several hundred idle men on the sidewalks of the little lumber town of Stirling City. Credit was given practically everywhere in town and the men were comfortable. But still there was nothing for them to do. On the third a few of the men were detailed to shoveling snow and the first real work was begun. Attention was immediately directed toward excavating the round-house which was buried in from eight to ten feet of snow. This accomplished, the little narrow-gauge locomotives

were pressed into service. With a steel nose to act as a snow-plow, arranged in front, the "One Spot" started the strenuous work of "breaking through"; work that continued for several weeks.

The average depth of snow on the tracks was five feet; although, in many places, the "One Spot" backed up three hundred yards or so and, at full speed ahead, rammed into nine feet of level



THEY COULD HEAR THE THUD OF THE GREAT PINE
AND THE SING OF THE BUCKER'S SAW.

in the State, depends upon the operation of many miles of logging railroad; it maintains about sixty miles of such roads leading further into the mountains from Stirling City. The construction and maintenance of a logging railroad through mountainous country are immense items of expense and tend to increase the cost of logging, perhaps, to a maximum.

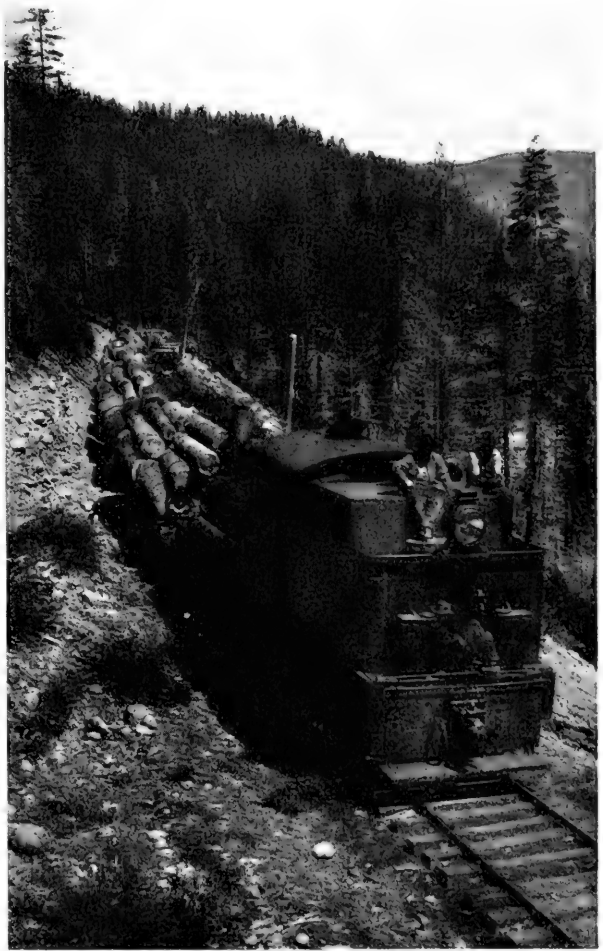
snow. The sight is one that comparatively few have seen. Through the average depth of snow the engine would force its way about twenty feet and then stick, unable to move in either direction. Each time she would have to be dug out until the drive wheels were free to move again.

To assist in pulling the engine free the "Two Spot" coupled on each time from behind. Backing up again, the same performance was repeated and the work continued for days and weeks until miles of road had been opened at an average cost of \$225.00 per mile. This work merely rendered the forest accessible, while the task yet remained of excavating the camps and reconstructing buildings whose strength had succumbed to the extreme weight of the snow. Upon abandoning camps before the winter, all water pipes had been drained; consequently, the problem of immediate water supply was simple although the pipes lay buried deep in the snow.

Four weeks of preparatory work being completed, the first train of logs finally left for the mill; but, some of them never reached their intended destination. At Kaiser Creek the rails lead onto a high curved trestle over a rushing mountain stream. As the cars ran onto the bridge, even slowly, the inside batter-post of one of the bents sagged under the old and familiar yet new and unaccustomed weight. The bridge inspecting crew had failed to detect what the winter had done to this particular mudsill and, as the result, the cars leaned, gently at first, inward; there was a spurt of steam from the "Five Spot" as her driver applied the brakes, a straining of log chains, a

shout from the "brakey" as he jumped to avoid the fall; and five cars of logs crashed down into the canyon below. Several such accidents occurred, and not without the loss of a few lives, before the road was entirely reliable.

Logging throughout the summer must



DOWN GRADE WITH A HEAVY LOAD OF LUMBER.

bear its share of this preparatory expense; and the cost of logging thus necessarily raised results, usually, in an increase in the selling price of lumber produced.

Wireless for Fighting Fires

Wireless telegraphy is being used in Canada in reporting on forest fires.

PRIVATE REFORESTATION

By M. H. HOOVER

DESPITE the activities of the State of New York to encourage the reforestation of waste and denuded lands by offering suitable trees at cost to private owners and by the enactment of more equitable taxation laws, the replacing of forest trees on lands now producing little or no valuable growth is generally not making the progress which the situation demands. The owners of denuded forest lands are usually ready to admit that the reforestation of their property would prove a splendid investment, but too many lack either the initiative or the capital to act on their convictions in this regard.

As for the State, the legislature has been backward in making appropriations necessary to the reforestation of its own forest preserve lands at a rate commensurate with the requirements of a vast area comprising about 1,600,000 acres, about one-third of which should be immediately replanted.

Of the State's 30,498,560 acres, total area, 12,000,000 acres or 40 per cent. are wooded. But only half of the wooded now contains merchantable timber, with 3,500,000 acres now ready for cutting in the Great Forest Regions and 2,500,000 acres in the farm woodlots. There are 4,500,000 acres with more or less valuable growth, but not now merchantable; and 1,500,000 acres with no valuable growth. There are 800,000 acres of unimproved farm lands which are best adapted to forest growth. In the State today we have 2,300,000 acres producing no valuable growth, a virtual waste of about eight per cent. of the State's total area, and almost three times the area occupied by the towns, cities and roads of the State. The College of Forestry at Syracuse in a recent bulletin declared that about one-half of the state's area could be best utilized in growing forest trees. That estimate seems to be much too high, in view of the fact that New York has

16 counties which the Federal census calls banner agricultural counties, and, in view of the value of the farm products of the Empire State. The Conservation Commission's estimate of one-eighth of the state's area being wasted, because not reforested, may be low. At any rate, the fact remains that both public and private land owners have an immense task, as well as duty, to perform.

Governor Glynn, not long ago, in an address to conservationists, inclined to the view that the state would have to adopt a more radical programme in order to effect the reforestation of the vast areas in New York which are idle. He believed that the forest lands taxation laws should be made still more liberal than they are; that the state should furnish trees at cost to private owners either in large or small lots; and that the state should itself undertake the reforestation of its lands at a rate that would replant its holdings within a few years; and that the state should itself replant privately owned forest lands, awaiting reimbursement until the tree crop should be finally harvested.

The forest products of New York State have shown a steady falling off, averaging a decrease of 25 per cent. during the years 1910, 1909 and 1908. In the last named year, the forest products of New York amounted to 1,226,754,000 feet. Last year they were a little over 900,000,000. We can no longer speak of New York's forest products output in figures of billions.

To restore the forests, for the protection of water sheds, for the needs of forest products, for the suitable habitats of fish and game, Governor Glynn's radical or progressive programme of conservation may have to be adopted. It undoubtedly would prove to be the best thing that could happen for the state of New York, from the standpoint of the lumbermen, the sportsmen and the lovers of nature.



SCOTCH PINE PLANTED FOUR YEARS.

PART OF THE WORK OF RESTORING THE CONIFER FORESTS ON THE LANDS IN NEW YORK STATE NOW OWNED BY THE BROOKLYN COOPERAGE COMPANY.

It is gratifying to observe the reforestation activities of some of the large owners of forest lands, notably those of the Brooklyn Cooperage Company. This enterprising corporation has large holdings in the Adirondacks, as follows:

18,000 acres in the Vilas Tract; 21,000 acres in the Everton Tract; 1,900 acres in the Pierrepont Lands and 7,500 acres in the Blake Lands. All the hardwood timber remains on these lands, except what was cut off after the fire of 1903. Very little of the timber was burned in the fire of 1903, and the fire due last year was avoided, by reason of the state's effective patrol system and the watchfulness of the Brooklyn Cooperage Company's own caretakers.

An inspection of the reforestation operations and their results on the Vilas Tract of the Brooklyn Cooperage Company gave most gratifying evidence of what private enterprise along these lines can accomplish. The burned areas are being rapidly turned into young

evergreen forests, and where there were dark scars of the fires ravages seemingly but the other day, the delighted eye is greeted with a thing of beauty that promises to be a joy forever. Under the new order of lumbering operations, recreated forests will not be blotted out, but will be harvested in a manner which shall insure always the presence of growing trees in a given forest area.

But, now as to the practical work of restoring the conifer forests which once flourished on the lands now owned by the Brooklyn Cooperage Company. These are the splendid results accomplished on the Vilas Tract under the direction of Mr. R. M. Parker, president of the Brooklyn Cooperage Company:

Summary of trees planted in open forests:

1910—50,787 mixed, mostly red and bull pine, 3-year transplants from the New York State Nursery.



A REPLANTED HILLSIDE.

THIS IS ON THE VILAS TRACT OF THE BROOKLYN COOPERAGE COMPANY IN THE ADIRONACKS.

1911—42,000 white pine, 3-year old transplants from the New York State Nursery.

1912—100,000 white pine, 3-year old transplants from the New York State Nursery.

1913—59,700 white pine, 2-year old transplants from the Brooklyn Cooperage Company Seed Beds.

1914—60,500 white pine, 3-year old transplants from the Brooklyn Cooperage Company Seed Beds.

These plantations, inspected by visitors in August showed on the average a vigorous growth. Owing to the burned over character of the replanted land, replanting was necessarily accomplished under difficulties. The work, however, must have been thoroughly done, as shown by the condition and progress of the young trees. The trees were planted at the rate of from 1,000 to 1,200 per acre. They stand on cut over or burned lands, with slight forest cover. Mr. Parker states that the trees of 1910 were poor in quality, but notwithstanding this handicap, the soil and environment in general about discounted it, and the young trees, especially the red pine, have done very well. Some of the most favored specimens measured 7 feet, and the average

is 6 feet. Owing to abundant rains, the growth this year was remarkably rapid. Apparently, the loss of trees in the 1910 planting was not much more than 5 per cent. The inspection showed that some red spruce planted in 1910 have done exceedingly well.

Owners of private forest lands in need of reforestation will be interested in President Parker's table of the cost of replanting. As already stated, the replanting was done on burned over lands requiring more or less clearing in order to set the trees, conditions making the cost about the maximum, yet the Brooklyn Cooperage Company is convinced that it has made an excellent investment in this work.

1910, \$18 per acre; 1911, \$25 per acre; 1912, \$16.50 per acre; 1913, \$17.25 per acre; 1914, \$13.15 per acre. Like every other industry, reforestation has to be learned. Moreover, a farmer raising cabbage or celery, does not buy his plants, if he has employees on the place who can put in their time growing them on his own soil. So the people of the Brooklyn Cooperage Company, with experience, learned how to do the best tree planting at the least expense, and President Parker established his own tree nursery.



NURSERY ON THE VILAS TRACT.

HERE THE BROOKLYN COOPERAGE COMPANY GETS A LARGE PORTION OF ITS SUPPLY OF SEEDLINGS FOR REPLANTING ITS LANDS. IT ALSO PURCHASES SOME FROM THE STATE NURSERIES.

Although, of course on a much smaller scale, the Brooklyn Cooperage Company Nursery at Balsam Camp, near the Five Mile Dam, West Branch, St. Regis River, St. Lawrence County, compares very favorably with the best nursery owned and operated by New York State. John A. Fraser, the Company's woods superintendent of St. Regis Falls, took charge of the work of establishing the seed beds and nursery in 1911. Mr. Fraser is a practical lumberman and woodsman, and he has satisfactorily demonstrated that he is also a practical forester and forest tree nurseryman. Under his direction, Wilber Wilson, caretaker of Balsam Camp for the Brooklyn Cooperage Company, has looked after the seed beds and nurseries, and they have prospered under his hand. The accompanying photographs show portions of the Balsam Camp nurseries, and some of the reforested lands of the company in the vicinity of the camp.

In 1911, the company set out 56 seed boxes of the usual size, sowing 10 pounds of seeds, which produced 142,000 seedlings. Two years later, 82,000 of these seedlings were taken out of the

seed boxes and transferred to the nursery, while 59,700 were committed to the care of the parent forest. In 1914, three-year old seedlings to the number of 60,500 were also planted in the forest, leaving 21,000 four-year olds for planting next spring. This year they planted 20 pounds of new seed and 10 pounds of old seed, and estimate from them about 100,000 seedlings. The seedlings of 1913 will be set in the nursery in 1915, and those of 1914, in 1916. Possibly some of the two-year old seedlings may be taken direct to the forest in 1916.

In addition to their own nursery production, the Brooklyn Cooperage Company has ordered from the Conservation Commission 50,000 three-year old Norway Spruce transplants to be planted with four-year old seedlings of 1911 and two-year old seedlings of 1913 next spring.

It is interesting to know that Superintendent Fraser finds that trees planted from the beds in the open seem to fare much better than those put in the plantation, as it appears that in the plantation of 59,700 trees in 1913 there is a loss of about 2% and of the 82,000



PLANTED IN MAY, 1911.

SHOWING THE TYPE OF COUNTRY IN WHICH THIS PLANTING HAS BEEN DONE AND THE VERY NOTICEABLE GROWTH.

put in the nursery the same year the loss was far greater.

President Parker believes that the estimate of seedlings in the seed beds this year may be increased, because from the seed that was sown during the spring of 1914, seedlings are still appearing.

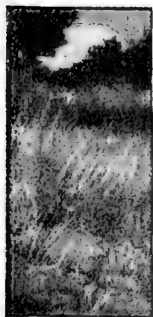
When complimented upon the success of his reforestation operations on Vilas Tract, President Parker said:

"The purpose of our plantation is with the spirit of the conservation of our lands. We have found no practical way of applying scientific rules of forestry to the hardwood forests in the Adirondacks, on account of the immense quantity of defective trees. Our cuttings are limited to 12 inches at the stump, and of course, we can only use in our lumber operations trees that are entirely sound, or do not show defects to a percentage large enough to

make cost of cutting and logging timber unprofitable. This results in leaving on the lands almost as many trees, 12 inches and up, as we cut. These trees are defective, being either cross-grained, showing rotten limbs, having immense knurls and knots on them, or other similar defects, which condemn the wood in the tree for merchantable cooperage stock. It is a pity this is so, but the hardwood growths of the Adirondacks on account of soil, consisting either of sand or of rotten wood, with practically no dirt, makes it impossible to grow a continuous hardwood forest of high grade. Realizing this, and knowing we shall hold our land for a great many years, we have thought it wise to plant such character of growth, as will in time, yield a profitable crop, and of course, white pine is the most valuable tree for this purpose."

Wood for Excelsior

The best excelsior is made from basswood, or linden. Aspen and cottonwood, however, supply nearly half of the total amount manufactured.



THE CANADIAN DEPARTMENT

By ELLWOOD WILSON

THE Director of The Dominion Forestry Branch reports that the reindeer herd imported from Labrador did not reach Fort Smith, Alberta, in the fall of 1911 but wintered about ninety miles south near Fort Chipewyan. There was plenty of feed and they wintered satisfactorily and were in good condition when the spring opened at which time they numbered thirty-two. One strayed away in April. There was no natural increase. In May the herd were moved by scows to Whitefish Lake where they arrived without mishap. Here an inclosure of about two square miles of a promontory was built, as it was feared that the herd might stampede when the flies became troublesome. In June the bull dog flies appeared and the deer stampeded and broke through all barriers and only twelve, all does, were recaptured. One more escaped in another stampede in November. They have now all been transferred to an island about six miles from shore with an area of about six square miles and it is hoped that they will thrive there. The Dominion herd of wood bison were also examined and several individuals were sighted and tracks of larger numbers seen, but the animals are very wild. The herd is estimated to contain between two and three hundred. The wolves do not seem to have made any serious depredations on the herd.

The new beaters for the Dominion Forests Products Laboratory have arrived and very important tests and studies will be made as soon as they are installed. No large scale experiments of paper beating have ever been scientifically made and much important information is looked for from these tests.

The English Government has sent out a Commission to investigate the possibility of Canada supplying much of the timber now imported from Europe, especially mine props. The Provincial Governments have removed the restriction that all wood cut on Crown Lands must be manufactured in Canada so far as these latter are concerned, in order to help the Mother Country.

The newly located goldfields at Beaver Lake, north of Cumberland House, Saskatchewan, are attracting considerable attention and the influx of prospectors is keeping the fire rangers in that district very busy.

Mr. P. Z. Caverhill, District Forester of the British Columbia Forest Service, Kamloops, B. C., reports that he has built 122 miles of trail and sixty miles of telephone line this season. He also says, "A start was made in the disposal of logging slash. The debris after a

couple of operations was burned broadcast last spring. On tie permits the brush was piled but has not yet been burned. An interesting sequence is the keen interest taken by the settlers in brush disposal and they are now requiring almost all operators on their lands to pile the brush. This will be a great help in the future fire situation."

Professor Adam Shortt, commissioner for the Civil Service Commission of Canada, has just returned from an investigating trip to England where he made a careful study of the English system. He reports civil service quite practical and it is to be hoped that the Dominion Government will now extend it to the outside service of the Forestry Branch. The Dominion Governments might with benefit study this report.

This season sees thirty-one students in the undergraduate classes at the Laval Forest school in Quebec. Of the 27 graduates all are employed. Eighteen are in the employ of the Province of Quebec and nine are with other Governments or in private companies. It is proposed to have an advisory committee of three members of the Quebec Limit Holder's Association to help direct the energies of the school.

The death of Dr. William Saunders, C. M. G., LL. D., F. R. S. C., for 25 years Director of Dominion Experimental Farms, will be a great loss to Canada. He was founder and President for several years of the Ontario Entomological Society and for thirteen years edited the *Canadian Entomologist*. Under him the Government established five experimental farms. His work in cereal development and in the improvement of plums and other native fruits of western Canada was of great value, and to these farms the success of wheat growing in the west was in large measure due. The arboretum and forest belts at the Central Experimental Farm, Ottawa, the plantations at Brandon, Manitoba, and Indian Head, Saskatchewan, have been a source of inspiration and information in farm forestry and the western plantings were the

forerunners of the system of free distribution of trees to farmers for planting around their homesteads, which has now grown to such immense proportions under the Dominion Forestry Branch.

Mr. J. B. White, Woods Manager for the Riordan Pulp and Paper Company, has been appointed a member of the Forestry Committee of the American National Wholesale Lumber Dealers Association.

Mr. Ellwood Wilson, Forester for the Laurentide Co., Ltd., has been appointed a member of the Standing Committee on Forest Protection of the American Forestry Association.

One of the forestry projects upon which the Commission of Conservation is engaged is a survey of the forest resources of British Columbia. This work was started last year and it is hoped that a fairly definite idea of the forest resources of the province will have been secured by the end of next year. For this work, the Commission has secured the services of Dr. H. N. Whitford, formerly of the Philippine Forest Service, and of R. D. Craig, for some years with the Dominion Forestry Branch, and later engaged in private forestry work in British Columbia. The plan of work is to collect, check and compile all available information. A large percentage of the accessible merchantable timber of the province is held under timber limits, and for most of these limits, one or more cruises have been made. The limit holders are co-operating generously with the Commission by furnishing information relative to the amount of timber on the individual limits. In addition a large amount of detailed information has been secured through forest surveys conducted by the Provincial Forest Branch, and by the Forestry Branch of the Canadian Pacific Railway. All this information is being used by Messrs. Whitford and Craig, and is supplemented by information collected at first hand, as well as by data secured from timber cruisers, surveyors, explorers and others. Previous estimates indicate that there is something like 300 billion feet of saw

timber in British Columbia, which is supposed to be approximately one-half the amount of merchantable standing timber in Canada. This is only one-fourth to one-fifth as much as the estimated forest resources of the United States. In addition to the amount of saw timber, there is a vast quantity of pulp wood of which no reliable estimates have been made. Fires have uselessly destroyed many times the amount of timber now left standing in Canada.

The Fire Protection Work of the Dominion Railway Commission has now been organized for nearly three years, and has shown excellent results. From being the greatest single source of fire damage, the railways now give promise of dropping well down in the list of minor agencies. They have also accomplished a great deal in the way of reporting and extinguishing fires not due to railway causes. The Board's order gives the Chief Fire Inspector very wide discretionary authority in determining what specific measures are necessary for the proper prevention and control of fires along railway lines. This is particularly the case with regard to special fire patrols in forest sections and the construction of fire guards in the prairies. The Order also requires the use of efficient fire protective appliances on locomotives, prohibits the use of lignite coal, requires the issuance of instructions covering the reporting and extinguishing of fires by railway employees, and gives the Fire Inspection Department power to regulate the burning of inflammable debris along the right of way. The Railway Act requires railway companies to maintain their rights of way free from dead or dry grass, weeds and other unnecessary combustible matter. In carrying out the above requirements, the Fire Inspection Department of the Board cooperates closely with the fire protective organizations of the Dominion and provincial governments. Under the plan of cooperation now in effect, more than seventy officials of these fire protective organizations have been appointed officers of the Fire Inspection Department of the Board, for the purpose of maintaining a constant supervision over the work of the railway companies, to insure that

the necessary measures shall be taken for the prevention and control of railway fires. Practically all the railways have shown great improvement in fire protection work. The Canadian Pacific and Canadian Northern Railways have organized especially for the handling of fire protection work, as a partial result of the Board's requirements.

Mr. R. H. Campbell, Director of the Dominion Forestry Branch, returned in September from his European trip. During the visit he attended the fiftieth annual meeting of the Royal Scottish Arboricultural Society, and was made an honorary member of the Society. An extensive tour was intended but the war suddenly prevented it while Mr. Campbell was in Geneva. Here he was detained for a week before securing transportation out of Switzerland through Paris to England.

The field reconnaissance work of the Dominion Forestry Branch progressed considerably during the past season. With eleven parties in the field, the division of agricultural and forest lands through the West was extended considerably. The surveys this year were distributed throughout Eastern Manitoba, Northern Saskatchewan and Alberta, Eastern Slope of the Rocky Mountains and Railway Belt of British Columbia. As a result, a continuous belt on the northern boundary of the prairies through Manitoba, Saskatchewan and Alberta about 100 miles wide and linking up with the timber slopes of the Rockies has been reported on to date. North of this belt lies an extensive area which is mostly forest land, but contains some good agricultural areas. Explorations have shown that the forest north of the prairies may be classed as two types, muskeg and ridge, the latter of which is characterized by Jack pine, spruce, and poplar. There are some areas of good agricultural land in this region which are mostly covered with small poplar.

The expense of the fire season in 1914 has been the heaviest in the history of the Forestry Branch. Owing to

a particularly dry period in August, ten bad fires occurred on the east slope of the Rocky Mountains, the largest burning 125 square miles before it was con-

trolled. Fires in the Railway Belt of British Columbia were more numerous still, but did not burn over extensive areas.

FORESTRY AT THE EXPOSITION

THE forestry and forest products exhibit at the Panama-Pacific International Exposition will be shown in the Palace of Agriculture, which with the exception of the great Palace of Machinery, is the largest exhibit palace of the exposition. The Palace of Agriculture covers an area of 328,633 square feet and was erected at a cost of \$425,610.

Group 134, under the official classification of exhibits, is divided into four classes of forestry exhibits comprising forest geography, maps, statistics and general literature, geographical distribution, botanical collections, seeds, bark, foliage, flowers, fruit, bark and wood sections. The planting, equipment and processes for tree collection, nursery practice, field planting and field sowing, make up class 661. Management and utilization, equipment and processes for protection from fire, insects and disease, organization of protective forces, ranger stations, trail and tele-

phone systems, logging methods and equipment, transportation of logs and systems of cutting, comprise another.

The indirect use of forests, such as watershed protection, effects on climate and public health, prevention of erosion and shifting sand, use of windbreaks for recreation or as a refuge for game, is all considered in a separate class.

Forest products are exemplified in three classes: lumber, equipment and processes used in cutting lumber—logs into lumber, drying, dressing and grading of lumber and the rules for grading; saw-mill and planing-mill products for the manufacture of lumber; wagon-stock, cooperage, boxes, pickets, shingles, and doors. Veneering and veneering-cutting machinery will also be shown. Forest by-products—tan-bark and extracts, naval stores, oils and distillates, charcoal, cork, dye-woods, medicinal and textile barks. Kiln-dried wood, wood fuels and wood will occupy another class.

A Forester's Directory

The American Forestry Association wishes to compile and to keep up to date, a directory of foresters, in the United States, its possessions, Canada and Mexico.

This will be of considerable benefit to the members of the profession, as the Association is frequently asked for information concerning the whereabouts of foresters, and is also often asked to recommend foresters for various positions.

The American Forestry Association therefore requests each forester, whether he is a member of the Association or not, to send his full name, address, name of school or schools of which he is a graduate, and the feature, if any particular one, of his profession, in which he specializes.

This directory will be kept up to date from year to year, and will be available for any inquirers at any time.

Foresters are requested to note, in the advertising section of AMERICAN FORESTRY magazine, a free advertising section for foresters wishing positions or for those wishing to employ foresters.



EDITORIAL

LUMBERMEN are daily learning of opportunities to export timber to Europe to take the place of the supply formerly obtained from European countries and which has now been cut off by the war. An instance of this is England's demand for mine props. Formerly most of these were obtained from the Baltic provinces and from France. Now England is looking to Canada and the United States to supply them. A Commission has been appointed to visit Canada to investigate the possibility of that country supplying most of the timber England now needs. The Provincial governments have removed the restriction that all wood cut on Crown Lands must be manufactured in Canada, as far as mine props are concerned, so that they may be shipped in the rough.

Commenting on the need of England for mine props H. O. Williamson, an

engineer of the Consolidation Coal Co., of Fairmont, West Va., writes AMERICAN FORESTRY Magazine:

"It is interesting to note that the English mine operators report a prop cost running as high as thirty-six cents. While there are a number of other factors, in addition to the availability of timber, entering into the subject of cost, still, even considering these, it is rather startling to compare this maximum of thirty-six cents with, say, our present maximum of possibly six cents."

The timber export question is further illuminated by a dispatch from London on Oct. 27, stating that German cruisers had seized four Swedish ships laden with lumber for England, and that Germany has declared it will consider all shipments of timber to Great Britain as contraband. The effect of this should be to increase the opportunities for American shippers.

WEST VIRGINIA is another State which desires an up-to-date forestry law, a State forester, and a well managed state forestry department. Wide-awake men of the State are lending their aid to the movement to secure such a forestry law and it is gratifying to note that almost every timberland owner and lumberman in the State is interested. Members of the legislature have already pledged themselves to give earnest consideration to the proposed bill and the State Chamber of Commerce has passed resolutions calling attention to

the value of the timber lands of the State, the need for their proper protection and to the benefit that will be derived by the entire State if such a forest law as is required is passed by the next legislature.

The arousing of popular demand for a State forestry department and a liberal appropriation for conducting it is now under way, all that is necessary to inspire such a demand being the ability to let the people know of the benefits which will accrue to them individually and to the State at large by the passage of a forestry law.

BALTIMORE'S experience with her street shade trees should be a warning to other cities throughout the country, many, aye most, of which have followed the same lack of system and carelessness in planting of trees.

A year ago Baltimore awakened to the need of a city forester. It was then found that of the 75,000 trees in the city's streets almost 60,000 were of undesirable species and that most of the trees had been improperly planted. This fault has resulted in some 20,000 of the mature trees being in a decadent condition.

Although the city forester has been at work only eighteen months and is handicapped by an inadequate appropriation, great improvement is apparent. The situation is described in an article in this issue.

IT IS hoped that by the time this is read, Minnesota will have carried an amendment to the State constitution, providing for the establishment of State forests on State lands which are unfitted for agriculture. The voters of the State cast their ballots for or against this measure on November 3. If public demand for a good thing has value in forming the opinions of the voters the amendment should have an overpowering majority. For some weeks there has been waged in the State a cleverly planned and admirably conducted campaign for arousing interest in the measure. This campaign was directed by the Minnesota State Forestry Association. Various civic bodies lent their aid, women's clubs in every town where they are established had their members personally communicate with influential citizens and ask their support of the measure, the railroads, the telephone

City officials are urged by the American Forestry Association to give more thought to shade tree conditions in the municipalities of which they are in charge. They will find that in practically every case the trees are being neglected, that most of them are improperly nourished, that species unfitted for climatic or street paving conditions have been planted; and that considerable damage, particularly in the smaller cities and towns, is being done by telephone, telegraph and electric light wires.

The value of beautiful shade trees and well-shaded streets is not properly appreciated. It should be apparent that well-shaded streets attract residents and thus maintain or increase real estate values and that no community ever loses by attention being paid to beautifying and improving it.

and telegraph companies gave their assistance, while the newspapers were particularly active in doing the invaluable publicity work needed to rivet the attention of the voters on the fact that the amendment would be upon their ballots, and what it meant to the State.

Perhaps the most effective work, however, was done by the children. The Governor proclaimed a State Forests Day for the schools and this was observed by every public school in the State. The five hundred thousand pupils addressed letters, furnished by the Minnesota Forestry Association, to their parents, asking them to vote for the amendment. At this writing there is every indication that the amendment will be carried and if it is, it will mark a big forward step in the conservation of the forests of Minnesota.

Changes of Address

Members of the American Forestry Association are requested to send notification of any change in address so that the AMERICAN FORESTRY MAGAZINE and other mail will not be delayed in reaching them.

Such notices are desired before the 25th of each month so that the address may be changed for the monthly mailing of the magazine.



FOREST NOTES

The Central West Virginia Fire Protective Association, with Merritt Wilson, President, George B. Thompson, Vice President, George W. Wilson, Secretary-Treasurer, as well as Lloyd Hansford of Parsons, H. W. Armstrong and B. L. Roberts of the Cherry River Boom and Lumber Company and Charles U. Luke and E. P. Shaffer, representing the West Virginia Pulp & Paper Company, attending, met at Elkins, West Virginia, on October 17. W. Hoyt Weber, Forester and Field Manager for the Association, and J. A. Viquesney, State Forest, Game and Fish Warden, submitted reports showing work completed and men employed. The State has constructed 13 lookout stations and 4 patrol routes, and the Government has supplied watchmen and patrolmen, under the provisions of the Weeks Law, for these lookout stations and patrol routes, numbering sixteen in all. The Association has already employed 8 patrolmen and authorized the employment of two more, making a total of ten patrolmen employed by the Association, or twenty-six salaried men in all. It is just one year since the contract was signed whereby Government aid was secured, under the Weeks Law, to protect the forests from fire, and under the triple alliance and co-operation of Government, State and private owners, it has been demonstrated that millions of dollars can be saved to the timber owners of the State. The timberland owners of the forest area of the State are greatly pleased that ways and means have been devised

to save the forests from fire, and all are anxious to join this organization and have their property protected under this arrangement.

A warning against tree repair fakirs has been issued by the Massachusetts State Forestry Association to its members. It calls attention to the necessity of exercising great care in having honest and competent tree surgeons and points out the damage that may easily be done by men who are not properly trained for the work and the exorbitant prices charged by those who take advantage of the ignorance of the tree owner.

Here is an exact reproduction of an application received by District Forester Smith Riley of Denver for a position as Forest Ranger. It is worth reading:

—————, Wyo.

Sept th 28—1914

"Dear Sir, I hear that you Want Forast-Rangers. and I think I Wood Souit you & the Job Wood Souit me, I have Ben in the West hear 9 years and am ust to hard-ships and like to Ride, all tho I am not no Bronko Broker. What I mean, is "if they Buck to hard they can throw me off" 'and I am all-so a good timber man as I have Ben in the timber all of my life., I have a comon School Edukation, "I am a married man With no Children Just me & Wife. My Wife has a 320 acare Home-Stead in ——— Co & has lived

on it 2 years all Reddy, 'can she go With me & still hold her Home-stead,? she has all-Reddy lived on it 23 months studdy Evvery Day; and is that Forast-Ranging a souitible Place to take a Wommon.

"Do you think the Job Wood last 3 or 4 years if I souited. how much Do you Pay a month. and Do I Board my self Or Dos the Government Furnish my suplys? Do I Furnish my Own hors? is there a little hosuse on "or around the Place Where I Wood make it my head-quarters.? You see I am Green at the Job now, But I think in a week after I got there I Wood no all about it, Pleas Rite and give me all of the infermation about it, there is 2 more single men hear in my Neighborhood Wood go to if they under-stood Just What kind of a Job it Was, yours sincearly"

James A. Connors, of James W. Sewall's office, Old Town, Maine, has taken a crew of men into northern Aroostook County, Maine, on a detailed township survey and timber estimate. Mr. O. W. Madden, of the same office, is cutting about a million feet of lumber for Mr. Sewall on the Passadumkeag River watershed.

Exception is taken by Bristow Adams, editor of the *Forest Service*, to a statement in the *American Lumberman* for September 19 that a disease which has attacked trees in Michigan is thought to have gotten into Michigan through seedlings sent by the National Government. Mr. Adams said this statement is not warranted by the facts in the case.

"Diseased specimens of western yellow pine," he says, "were submitted last spring for examination by the Office of Investigations in Forest Pathology in the Bureau of Plant Industry. The trees were said to have been grown at the Higgins Lake Nursery from seed obtained from the West and were found to be affected with the fungus disease *Cronartium comptoniae*. This is a well known eastern fungus which passes one of its stages on the sweet fern. In its stage on the pine it has also been known

as *Peridermium pyrifforme*. It seems evident, therefore, that the western yellow pine trees in question became infected from sweet fern in the neighborhood, and, never having been exposed to the disease, might readily prove more susceptible to it than the native species. The disease is referred to in the item in the *American Lumberman* as "*Peridermium fusiforme*," a quite distinct disease which was not found by the Office of Forest Pathology in its examination. Even if this disease is present among the yellow pine, however, it could hardly have been introduced by the Government, since, so far as the records in this office show, no trees have ever been furnished to the State by the Forest Service and the disease is not one which could be transmitted through the medium of seed.

The annual meeting of the Western Forestry and Conservation Association, the established conference of all Pacific Coast protective organizations and the most important yearly gathering of timber owners in the United States or Canada, will be held in Tacoma this year, December 7 and 8. The fire protection part of the program will abandon the general topics so thoroughly covered in the past and deal only with important needs disclosed by the past season; the chief of which seem to be a better system for financing emergency expenses, perfecting state policies and legislation, requirements for continuation of Weeks Law funds, and utilizing fire wind forecasts in the most practicable manner. A study of timber insurance possibilities will be reported. While what is really new and important in fire work must not be neglected, it has been decided that at this time such an important gathering should devote much of its time to other matters of pressing interest. With the proper officials present to give us authentic information, there will be discussion of the new Government study of the lumber industry, the Trades Commission bill, Forester Graves' new plan for capitalizing national forest resources to assist state road building, and taxation amend-

ments now up in Pacific states. The stumpage situation and its trend is another subject chosen for expert analysis.

Foresters will be interested in the announcement that Charles Deering of Chicago and W. A. Wadsworth of Genesco, N. Y., members of the American Genetic Association, have offered two prizes of \$100 each for two photographs—one of the largest tree of a nut-bearing variety in the United States, and one of the largest broad-leaf tree which does not bear edible seeds. In the first class, for example, are included trees such as chestnut, oak, walnut, butternut, and pecan; and in the second, trees such as elm, birch, maple, cottonwood, and tulip poplar. No photographs of cone-bearing trees are wanted, since it is definitely known that the California big trees have no rivals among conifers. At a later time the association may take up the same question as between the various kinds of conifers—as pines, spruces, firs, cedars, and cypresses.

The purpose of the competition is to find out in what regions the native trees attain their largest growth, and under what conditions they thrive best. When these large trees are located and the measurements authenticated, the association hopes that it may be possible to secure seeds, cuttings, or grafting wood from thrifty trees in the region where they grow, to see whether finer specimens may be propagated in other parts of the country. It is hoped in this manner to get some particularly choice strains of native trees established in regions where good specimens are not now found. The contest ends July 1, 1915.

Prof. James B. Berry has been placed in charge of the Department of Forestry of the State College of Agriculture at Athens, Ga., and the Board of Trustees on October 13 changed the name of the department to the Georgia State Forest School. In this way the school has all the privileges of an

independent institution and yet retains all the advantages connected with the instruction work in the University proper and the Agricultural College. It thus becomes the only forestry school in the south. The school is now being thoroughly equipped and Prof. Berry expects to secure a large number of students.

Prof. Berry is a graduate of the College of Forestry, University of Minnesota; spent fifteen months in the Forest Service as Forest Assistant on the Inyo National Forest of California; was for two years instructor in forestry at the Pennsylvania State College where he was granted the degree of Master of Science as a result of special investigative work in range problems. He spent fourteen months in Germany and Austria-Hungary, completing one year's work in the Universität München where he was a Candidate Doctor der Staatswissenschaft.

The Georgia State Forest School will offer a regular four year course in forestry leading to the degree Bachelor of Forestry. A small amount of forestry will be introduced in the Freshman and Sophomore years, but the bulk of the work will come later. Following the Junior year is a summer camp of eight weeks which will be largely devoted to surveying, mensuration, forest botany and forest ecology.

The Massachusetts State Forestry Association has announced another annual tree planting contest, following the successful one of this year, and as a prize will plant in each of the four winning towns one hundred shade trees. The towns are divided into four groups, according to size, and to be eligible for a prize a town must plant at least one hundred trees. Those planting the most and having the largest number of living trees on Sept. 15, 1915, will be awarded the prizes. The trees counted must be eight feet or over in height and the branches should be properly pruned at the time of the planting. For full particulars write the Association at 4 Joy Street, Boston, Mass.

BOOKS RECEIVED

THE FIRST EXPOSITION OF CONSERVATION AND ITS BUILDERS (W. M. Goodman, Knoxville, Tenn., \$10.00).

Here artistically bound, well illustrated and admirably printed, is a large volume devoted to the history of the National Conservation Exposition at Knoxville in 1913, of the movement which started it and of the men and women who were its builders and to whom such a large measure of its success was due. There is an introduction by Gifford Pinchot and then a very well written and complete history of the Exposition with a series of special chapters devoted to each of the several buildings and their exhibits. Great care has been taken to give each of the people deserving mention for aid in the work of organizing and conducting the Exposition the proper credit. A special feature are the papers on various phases of conservation work written by men and women who are recognized as experts and there are also extracts from addresses by prominent speakers on special days at the Exposition. It is a book which will be appreciated and valued by any person having part in the Exposition, for not only is

it brim full of information, but it is mechanically a production which will attract most favorable comment.

"ELEMENTS OF FORESTRY" by Frederick Franklin Moon, B. A., M. F. and Nelson Courtlandt Brown, B. A., M. F. (John Wiley & Sons, New York, \$2.00 net.)

This is an up-to-date text book, broad in its scope and containing general information on all phases of forestry. The authors have made an earnest endeavor to present the instruction in a manner easily grasped by the average student. The subject is treated under the chapter headings of trees, silvics, silvicultural systems and management, improvement cuttings, artificial regeneration, forest protection, forest mensuration, lumbering, wood utilization, wood technology, wood preservation, forest economics, forest finance, forest regions, northern forest, sprout hardwoods, southern pines, central hardwoods, prairie or fringe forests, northern Rocky Mountain forest, southern Rocky Mountain forest, and Pacific Coast forest. The book is profusely illustrated. There are 300 pages.

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The text books of the Biltmore Forest School, written by Dr. C. A. Schenck, continue for sale at Biltmore. For particulars address BILTMORE FOREST BOOKS, Biltmore, N. C.

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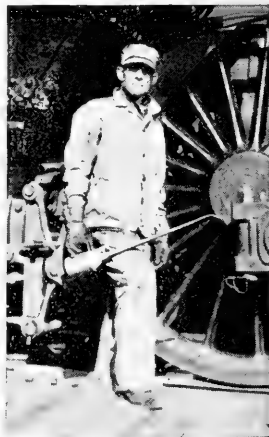
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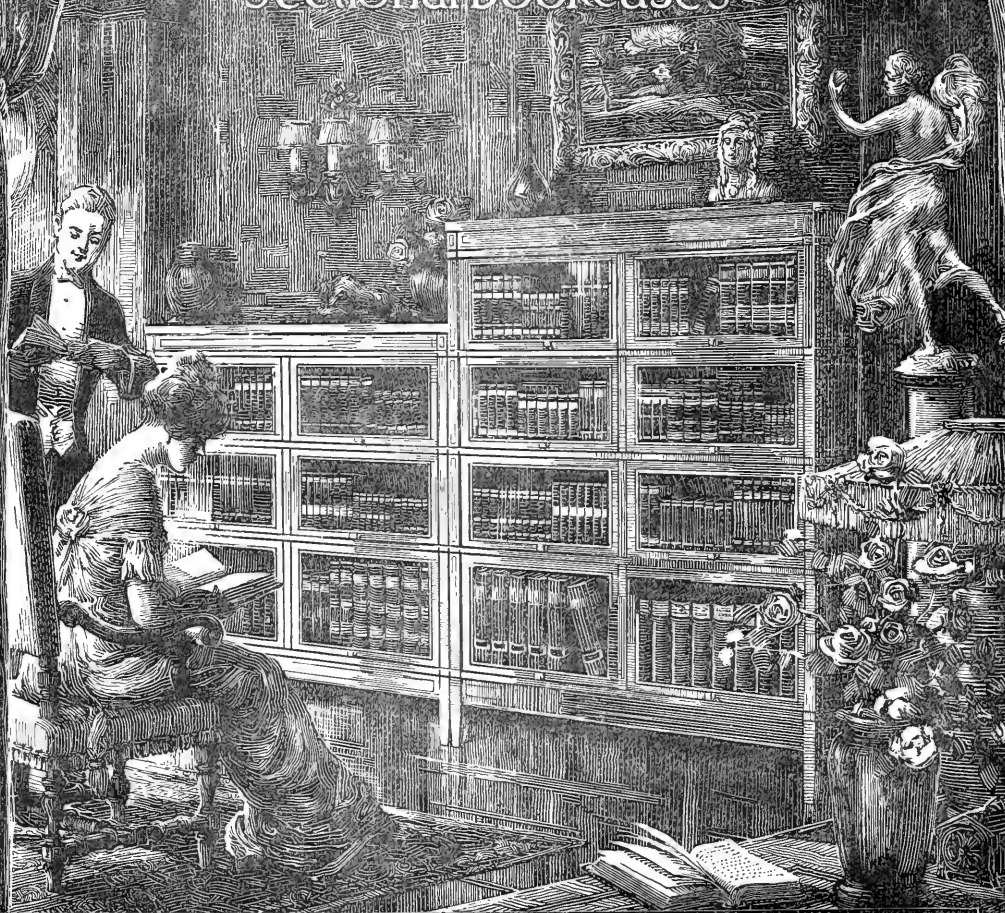
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December	CONTENTS	1914
COVER PICTURE—Illecillewaet Valley, British Columbia		
THE SWITZERLANDS OF AMERICA—By Agnes C. Laut.....	With fourteen illustrations.	839
FORESTERS IN THE GREAT WAR—By Samuel T. Dana.....	With nine illustrations.	858
NATIONAL FOREST ADMINISTRATION—By Hon. David F. Houston.....		867
TAHITI—By E. T. Allen.....	With eleven illustrations.	870
BUYING HANDLES BY WEIGHT.....		880
THE EUROPEAN WAR AND THE LUMBER TRADE—By R. C. Bryant.....		881
PENNSYLVANIA FORESTRY PROGRESS.....		886
TACKLING TAMALPAIS—By Frederick E. Olmstead.....	With five illustrations.	887
FIRE CONDITIONS IN CALIFORNIA—By Alexander W. Dodge.....		893
THE CANADIAN DEPARTMENT—By Ellwood Wilson.....		894
ANNUAL CONSUMPTION OF WOOD.....		897
EDITORIAL.....		898
FOREST NOTES.....		901
ARBORIST—FORESTER.—By Alfred Gaskill.....		906
CURRENT LITERATURE.....		907

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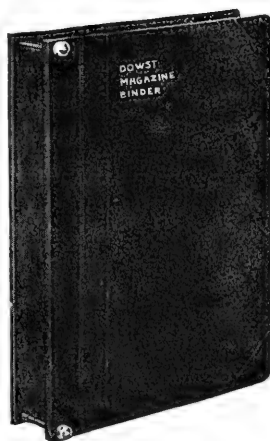
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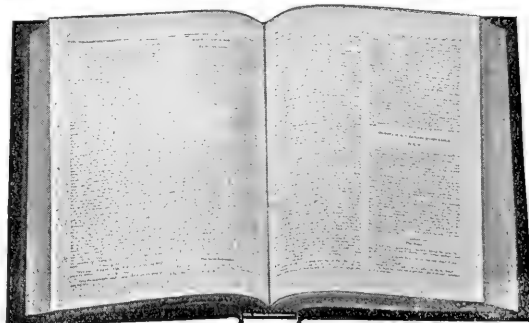
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No. 12

THE SWITZERLANDS IN AMERICA

By AGNES C. LAUT

FOR twenty years geologists and explorers have sung the beauties of mountain scenery in America to an unheeding world. Americans have been told and retold how you could lose a Switzerland in the ice fields of the Canadian Rockies, or count more unclimbed peaks in Glacier National Park than there are climbed peaks in Switzerland, or drop the Alps into the bottom of Grand Canyon and see only peaks come above the rim of the deep gorge—Americans have been told and retold all this. They would have none of it. They either did not believe it, or did not want to believe it. For one person who bought a round trip ticket to the American West, two bought round trip tickets to Europe.

That was until the War broke out. Until the War broke out, America had lacked the human, lacked the historic, lacked the picturesque. Suddenly, American tourists found they were suffering from a European brand of too much human, too much historic, too much picturesque. Their own land took on instantaneous roseate hues. Never was such an immediate cure of the foreign mania witnessed that everybody wanted to see America first. Said an American woman, who landed bedraggled in London without a hat but carrying a bird cage and a band box—"Never again! I'm cured of Europe! Terra cotta, or terra firma, or any old American terra is good enough for me!"

Within a week of the declaration of War, American railroads were overwhelmed with enquiries for accommodations West. At first, they thought it a backwave of tourists from Europe; but

as enquiries continued, it became apparent that American tourists for the first time in history were going to explore their own land. One heard no more of the fustian nonsense about America lacking human interest. All the pseudo-culture of chasing over Europe with a club for the unattainable in one's own soul, all the tinsel glamor of Paris fashions and European art, suddenly sloughed off and revealed the primitive monster horrors of blood-lust and rapine and ruthlessness. Culture and art and glamor went down under the feet of a Great Blonde Beast rampant that Americans had not dreamed could exist under the mask of a civilization top heavy with learning and mellow with centuries. Raw, crude, rude, new America seemed a mighty good place to be. American cowboys might shoot up saloons and jingle their spurs and give extemporized "neck-tie" parties to murderers and thieves; but they didn't bayonet babies and shoot priests and rob women and loot tourists. Also, the spectacle of every nation in Europe wooing America, kow-towing to Uncle Sam of striped pants and prunella gaiters—must have stiffened up a good many flabby tourists back bones. Anyway, for the first time, the tide of American travel has turned back on itself. For the first time, America is going to tour her own lake country, and visit her own battlefields, and climb her own mountains, and parade her own Rivas—of which she has distinctly four. It will be a surprise for the most of Americans to learn that four lake sections exist on their own continent equal in beauty to the Tros-



Courtesy of the Southern Pacific Ry.

YOSEMITE FALLS IN YOSEMITE VALLEY, CALIFORNIA.

YOSEMITE FALLS PLUNGES OVER THE CLIFF TO THE FLOOR OF THE VALLEY 2600 FEET BELOW. THERE ARE IN REALITY THREE FALLS. THE FIRST AND LARGEST LEAP OF THE STREAM IS 1600 FEET STRAIGHT DOWNWARD; THEN COMES A SERIES OF CASCADES FOR 600 FEET, AND FINALLY THERE IS ANOTHER VERTICAL DROP OF 400 FEET.



Courtesy of the Southern Pacific Ry.

CATHEDRAL ROCKS, YOSEMITE VALLEY, CALIFORNIA.

THESE PINNACLES ARE REMINISCENT IN THEIR FORM OF DIOMEDA FLORENCY. ONE OF THE SPIRES RISES 2678 FEET ABOVE THE VALLEY AND IS UNSUPPORTED AND UNCONNECTED WITH THE MOUNTAIN FOR 700 FEET, WHILE THE OTHER SPIRE IS 2579 FEET ABOVE THE VALLEY.

sachs of Scotland, or Lake Country of Italy. Of battlefields, there are more than enough; but only a few are as much as marked; and I doubt if any guide book exists to pilot the tourists to those few. In Florida, on the inner coast of the Gulf, at Galveston, from Monterey to Santa Barbara—are American Mediterraneans; and from Grand Canyon to the Canadian Rockies lies a succession of Switzerlands practically unexplored.

The great mountain playgrounds lie for the most part within the bounds of the National Forests. There are six distinct belts of as different a character as the Dolomites of Austria from the Trossachs of Scotland; and it would be just about as sensible to attempt to do all the mountain resorts of Europe in one season as all the mountain playgrounds of America.

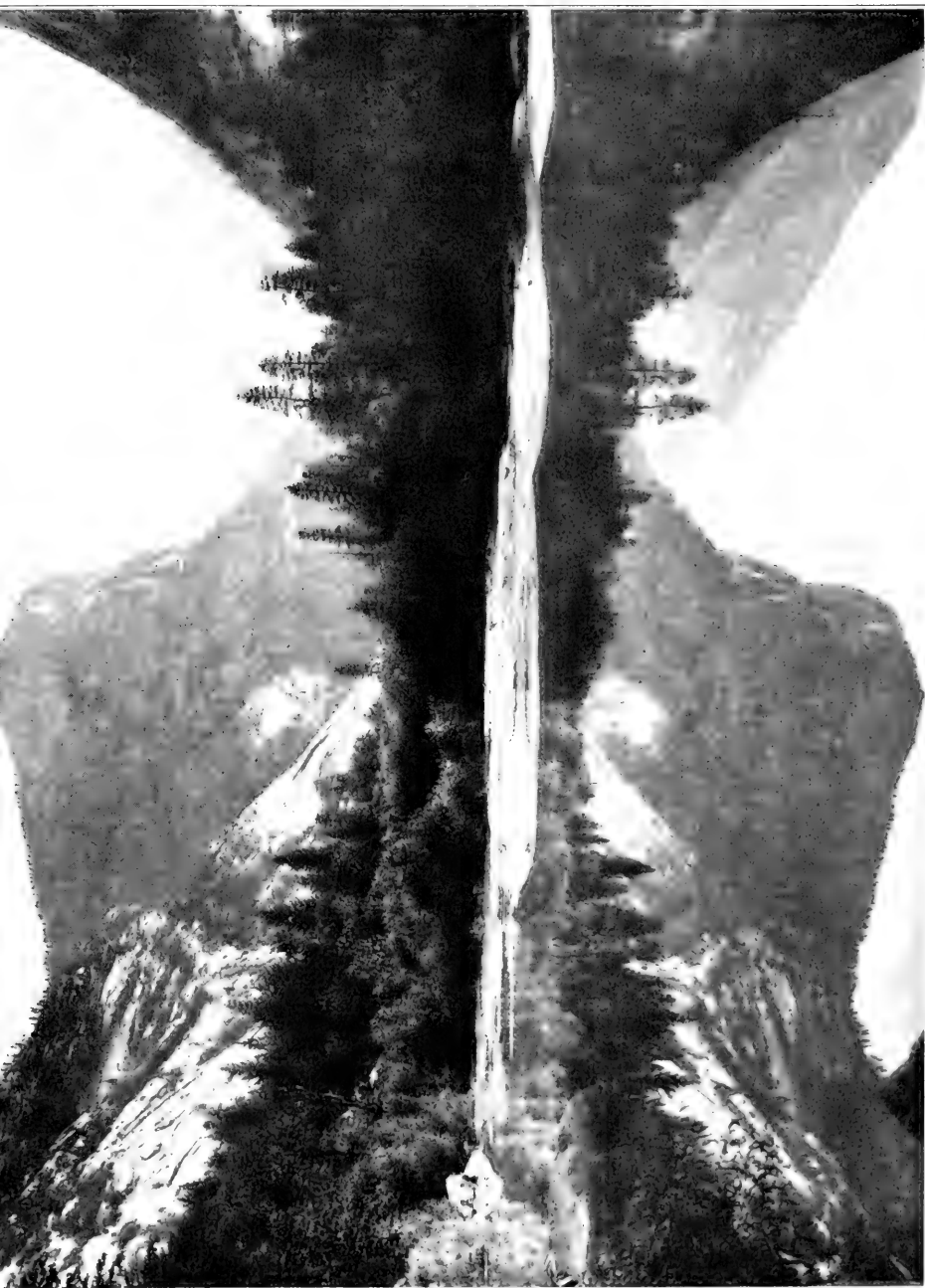
Begin at the South! There is the Grand Canyon Painted Desert region—though it will be news to the most of Americans to know that chains of mountains high as the Rockies lie sunken in the abysmal gorge of the Canyon and that snow peaks loom opalescent above the lavender mists of the Desert.

North of the Painted Desert come the mountains of Estes Park and Colorado—high park-like areas of Englemann spruce with turquoise lakes lying in alpine meadows and a rush of angry waters coming down from the snowy peaks. In fact, on one railroad in Colorado you can lunch in a snow shed 11,000 feet above sea level and play snow ball in mid-August.

Westward are the Sierra groups of mountain resorts—Hetch-Hetchy and the Yosemite and the Mariposa Grove—all made famous by Muir's pen, and yet more famous by their exquisite beauty and remote aloof grandeur—as of a still isolated sacred world.

Yet northward come three more mountain playgrounds—Ranier, Glacier National Park, and the Canadian Rockies—all distinguished by similar characteristics—dense forests of pine and hemlock, enormous fields of glacial ice and snow—I have tramped some of these fields twenty-five miles without

leaving snow—and lofty pinnacled peaks, with a roar of mountain torrents, down from the eternal ice and snow to wild gorges where the mad plunge of the water has literally torn a path through the solid rock. The phrase "eternal ice and snow" is not metaphor. It is literal. On Mount Ranier, in the Illecillewaet and Asulkan Valleys, down the back of Cathedral Peak, lie snow and ice that date from the ice age. Round the Valley of the Ten Peaks, or Moraine Lake, you can ascend glaciers and glacial moraine, where you can literally count the years and the decades of years back the centuries like the rungs of an ascending ladder, from the ledges or circles of ice pack and snow pack. That is—the year's snow fall of fifteen or twenty feet packs and thaws into a solid layer, distinguished from the preceding year by its silt of pulverized rock and atmospheric dust. Between two of the Ten Peaks you can climb a glacier for three miles where the year's snow fall lies like steps of a stair. Similar ledges of ice are observable on the glacier below Mt. Victoria—that white wall of alabaster that stretches for twelve miles between sky and earth above the wonderful peacock blue lake at Laggan. Where the train dives into a snow shed in the Canadian Rockies, or in Colorado, and one comes out to see huge mountain slopes swept clear as by a mighty broom—the force and terrible swiftness of the avalanche seem near; but at Lake Louise, Laggan, you can sit in your bedroom and see the snow slides slip over the white ledges of Mt. Victoria like tenuous wind-blown falls; and never realize that you are watching an avalanche till you hear the far boom of the fall like thunder. It does not need to be told here—that glaciers are not advancing but receding—an inch or two a year—like the foot of an icy ancient drawing back from modern days. Nor need it be told here that you can always tell the character of the Upper Alpine Country by the color of the mountain streams below. Streams from a glacier are milky from the silt worn off the under rocks by the grind of the centuries' ice. The silt often—as in the Big Bend of the Columbia—imparts an almost vitriol greenish blue.



Courtesy of the Southern Pacific Ry.

MIRROR LAKE, YOSEMITE VALLEY, CALIFORNIA.

THIS BEAUTIFUL SHEET OF WATER IS HAPPILY NAMED FOR UPON ITS PLACID SURFACE ARE PERFECTLY REFLECTED THE TOWERING FORMS OF THE HALF DOME
CLOUD'S REST AND MOUNT WATKINS. SUNRISE UPON MIRROR LAKE IS JUSTLY FAMED.



Copyright by Haynes, St. Paul.

Courtesy of the Northern Pacific Ry.

DAISY GEYSER, YELLOWSTONE NATIONAL PARK.

ONE OF THE SEVERAL WONDERFUL GEYSERS WHICH HAVE ATTRACTED THE ATTENTION OF TOURISTS EVER SINCE THIS, THE OLDEST OF ALL THE NATIONAL PARKS, WAS OPENED IN 1872. THIS GEYSER IS IN THE LOWER PART OF THE UPPER GEYSER BASIN NEAR THE GROTTO AND GIANT GEYSERS. IT PLAYS ABOUT 75 FEET HIGH FOR ABOUT THREE MINUTES AT A TIME AT INTERVALS FROM ONE AND A HALF TO TWO HOURS. DURING 1914 IT HAS BEEN MORE ACTIVE THAN USUAL.



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MAMMOTH HOT SPRINGS AND HOTEL VALLEY FROM TERRACES, YELLOWSTONE PARK.

MAMMOTH HOT SPRINGS IS THE ADMINISTRATIVE CENTER OF THE PARK. IT IS THE HEADQUARTERS OF THE GOVERNMENT OFFICIALS AND OF THE YELLOWSTONE PARK TRANSPORTATION COMPANY AND THE HOTEL COMPANY. THE MARVELOUS PAINTED TERRACES ON THE SIDE OF TERRACE MOUNTAIN WITH THEIR IMMACULATE HOT-WATER RESERVOIRS ARE THE CHIEF OBJECTS OF INTEREST. BUT THE SPOT IS MOST PICTURESQUE ASIDE FROM THE TERRACES. IT IS A GREAT MOUNTAIN BOWL WITH BREAKS OR PASSES HERE AND THERE THROUGH THE HIGH MOUNTAINS THAT AFFORD VIEWS OF RARE BEAUTY.

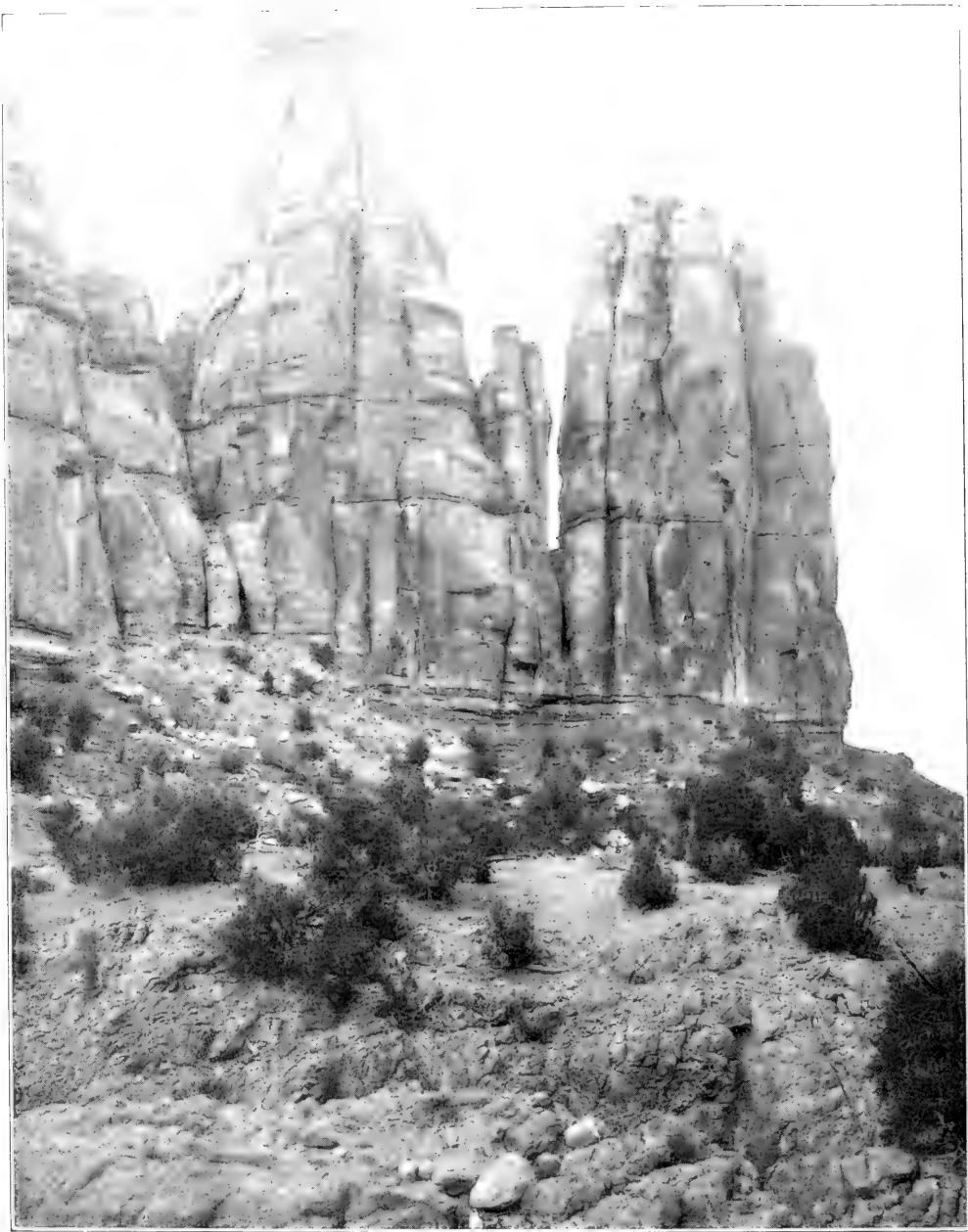
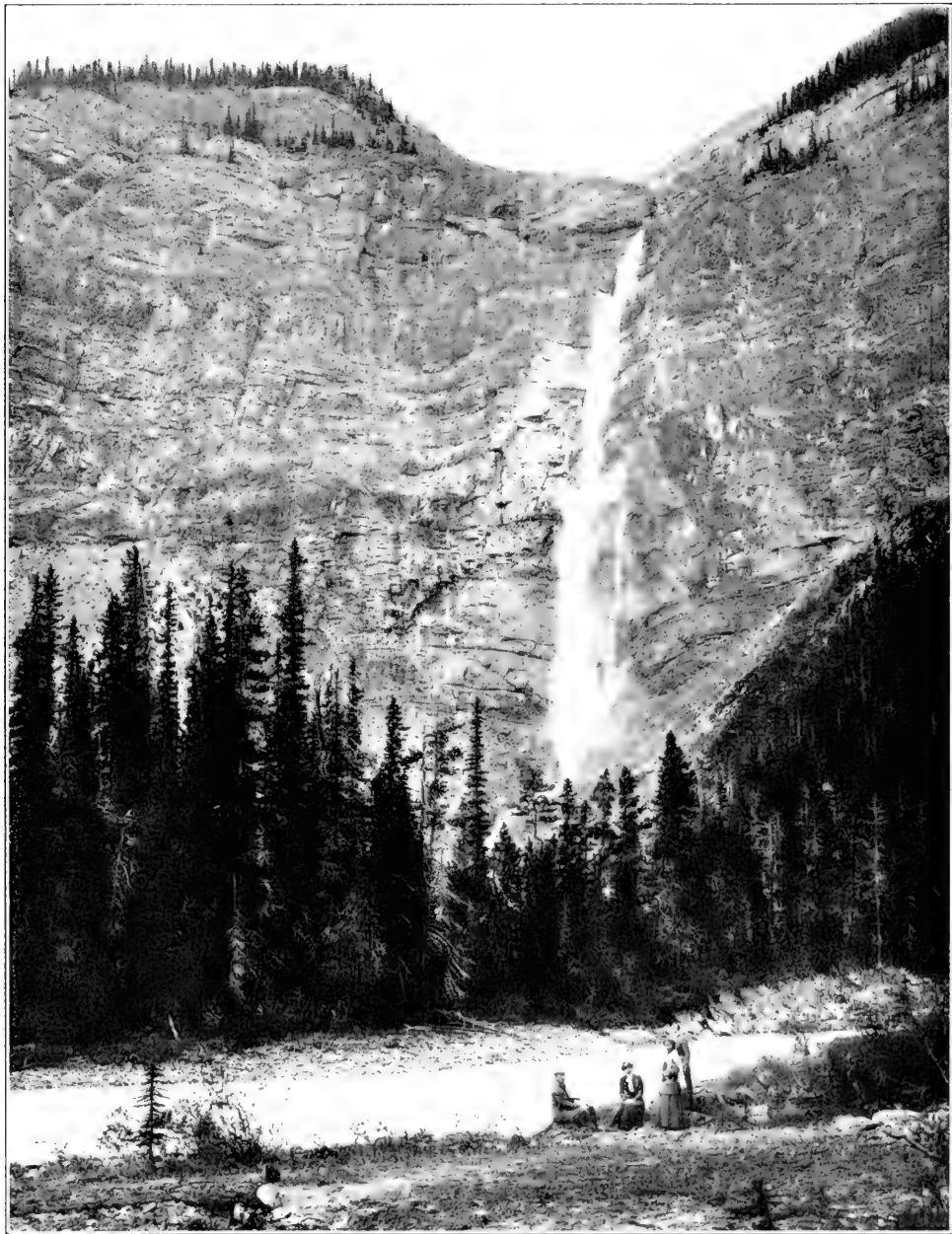


Photo. by G. L. Beam, Denver, Colo.

Courtesy of Denver & Rio Grande Ry.

THE COURT GROUP.

ONE OF THE SIGHTS OF THE COLORADO NATIONAL MONUMENT NEAR GRAND JUNCTION, COLO., ON THE DENVER & RIO GRANDE. NEAR VIEW OF "COURT GROUP" WITH "DOME OF JUSTICE" NEAR CENTER AND "NINE JUDGES" AT RIGHT. NOTE FIGURE OF MAN ABOUT HALFWAY FROM CAMERA TO ROCKS WHICH WILL GIVE AN IDEA OF THEIR TREMENDOUS SIZE.



Courtesy of the Canadian Pacific Ry.

TAKAKKAW FALLS.

ONE OF THE SCENIC WONDERS IN THE CANADIAN ROCKIES NEAR FIELD, BRITISH COLUMBIA. THIS REMARKABLE CATARACT IS IN THE YHOH VALLEY, MAKING A DESCENT OF TWELVE HUNDRED FEET. IT IS A FOURTEEN MILE DRIVE FROM FIELD.

Soil along the banks of a glacial stream is soft and fine as wet flour. It has been ground by the mountain gods between the upper and nether mill-stones of ice and adamant. Streams from snow peaks are clear as crystal. They come shouting down the mountain sides with a leap of foaming laughter and joy as of life disimprisoned by sun warmth from snow death; and they hardly quiet their wild leaping till far out on the prairie, as East of Denver, or East of Calgary.

I have been asked by sluggish souls what good it does you to risk breaking your neck climbing mountains. It is like asking what good it does to bathe both body and soul in an atmosphere of ozone that electrifies every dull nerve in your body and turns amuck in every one of your slow-going blood corpuscles a small galvanic battery. It is like asking what good it does you to gain a new lease of life, so that you are no longer tired in muscle or mind: what good it does you to breathe ten thousand years of atmosphere distilled of untempered sunbeams and the healing resin of the pines. An Easterner lies quiescent in a bower of roses and forgetfulness—that is his Nirvana. Not so the Westerner—when mind and nerves are tireddest is the time he shouts not for quiescence, but for life, more life, and that is what the mountains impart with their ozone stabbing to new life, and their leaping torrents shouting of life, disimprisoned life, and their pines tossing wild arms to the winds of heaven, taking but the deeper grip of the eternal rocks the wilder the tempest. Mountains are what explain that most precious possession of Northern races—virility, grip, fire!

To come down from the mountains to very mundane practical considerations for the tourists, who are going to see their own country first—it need not be told that you cannot tour the American West in the luxury you tour Europe. You can go to the foot hills of pretty nearly every peak of first rank in a motor, if you want to; and if you want to, at the foot of that peak you can sit you down in a palatial hotel that is an imitation of a hotel in London or Paris, and pay you the most palatial

prices—prices to make up for the fact you didn't take the \$1,000 cabin crossing the Atlantic. But if you really want to see the West, there is a better way of turning the trick. I am sorry I cannot give the same recipe for turning the trick in each of the six belts of mountains; but you must go differently to each. Don't attempt to do all, or even part of one, in one year! Choose what you want to do! Then choose your playground! Then write to the National Forest Supervisor of that playground for directions! If you want to hunt, do not go to those National Parks which have perpetual closed seasons for game—such as the Banff Park region, or the Grand Canyon Park. If you want to fish, don't go to the Desert, unless to such exceptional valleys as the Verdes of Arizona; and if you want to sleep under the stars, don't go to the Northern mountains which are misty and cold at night in the warmest summer months. At two o'clock on an August morning on Moraine Lake I have put on a buffalo coat and called in the camp dog to put my feet on him and kindled the camp fire, and then shivered. And if you want to see seracs—where the glaciers tumble over a precipice and form blue ice caverns—and to negotiate crevasses where the snow has covered a chasm a thousand feet deep, better go far North; and always—literally always without one exception—go in twos and threes and go roped; so if one falls in, the weight of the other two on the rope will haul him out. I have violated this precept and paid for it; and I never knew a climber to violate it and not pay for it—so that guides have come to the point where they say “only a greenhorn or a fool takes chances on mountains.”

A party of Eastern university men had hired all the guides available but one. Not meaning to go far and taking only a light lunch, I roped up with this guide and set out to see some seracs at Glacier. I love rock climbing and if properly booted never tire of it; but I loathe ice. I cannot think of any reason why I loathe ice and love rocks except that I was brought up in a prairie country where the sidewalks



Courtesy of Canadian Pacific Ry.

GLACIER HOTEL AND STATION.

A SCENE WHICH RIVALS ANYTHING IN SWITZERLAND, ON THE CANADIAN PACIFIC RAILROAD AT GLACIER, BRITISH COLUMBIA. THE VIEW HERE IS MAGNIFICENT. THE MOUNTAINS SEEMINGLY BUT A FEW HUNDRED FEET AWAY ARE IN REALITY MORE THAN TWO MILES. THE ICE FIELD IS THE GREAT ILLECILLAWEET GLACIER. TO ITS LEFT TOWERS THE NAKED PYRAMID OF MOUNT SAINT DONALD TO A HEIGHT A MILE AND A QUARTER ABOVE THE RAILROAD.



Courtesy C. M. & St. P. Ry.

ON THE NISQUALLY GLACIER, RAINIER NATIONAL PARK.

PARTIES OFTEN ASCEND THIS GLACIER TO WHAT IS KNOWN AS THE CASCADES, WHERE THE ICE RIVER PLUNGES OVER A STEEP DECLIVITY, BREAKING INTO DEEP CREVASSES. WITH A GUIDE THIS IS NOT AN ESPECIALLY HAZARDOUS TRIP, BUT NO ONE SHOULD VENTURE ON TO THE GLACIER WITHOUT ONE OF THE COMPETENT ACCREDITED GUIDES, FOR THE CREVASSES YAWN WHERE LEAST EXPECTED,—OFTEN COVERED WITH A THIN LAYER OF SNOW WHICH WILL BREAK THROUGH WITH SLIGHT WEIGHT AND ONLY THE EXPERIENCED EYES OF THE TRAINED MOUNTAINEER CAN DETECT THE DANGER.



Courtesy of the C. M. & St. P. Ry.

REFLECTION LAKE AND INDIAN HENRY'S HUNTING GROUND.

THIS IS ONE OF THE MANY FLOWERY SLOPES THAT LIE ON MT. RAINIER BETWEEN THE GREAT GLACIERS, AND CLOSE TO THE SNOW LINE. IN THIS "PARK" THERE ARE SEVERAL HUNDRED VARIETIES OF ALPINE FLOWERS INCLUDING SOME THAT ARE NOT FOUND ANYWHERE ELSE ON THE MOUNTAIN.



Courtesy of C. M. & St. P. Ry.

ROAD ABOVE NARADA FALLS ON THE WAY TO PARADISE PARK.

THE GOVERNMENT ROAD ASCENDS THE SOUTHERN SLOPE OF THE MOUNTAIN TO PARADISE PARK, ONE OF THE FLOWERY CARPETED "PARKS" CLOSE TO THE SNOW LINE IN MT. RAINIER NATIONAL PARK. HERE FLOWERS BLOOM EVEN AS THE SNOWS ARE MELTING AND WHILE JULY 1ST OFTEN SEES TWENTY FEET DEEP IN "PARADISE," JULY 15TH WILL FIND FLOWERS ALL ABLOOM, COVERING THE MEADOW WITH A GORGEOUS FLORAL CARPET.



By Courtesy of the C. M. & St. P. Ry.

MT. RAINIER FROM RICKSEEKER'S POINT.

RICKSEEKER'S POINT IS A BOLD HEADLAND THAT JUTS OUT ON THE LOWER SLOPE OF THE GREAT MOUNTAIN. THE GOVERNMENT ROAD TO THE SNOWY MOUNTAINS CREEPS AROUND THIS DIZZY HEIGHT, —AND LOOKING BACKWARD AS YOU ARE ASCENDING, THE MIGHTY PEAK TOWERS ALMOST OVER YOUR HEAD, WHILE A THOUSAND FEET BELOW THE PARADISE RIVER ROARS ON DOWN ITS NARROW CANYON TO JOIN THE NISQUALLY RIVER, ONE OF THE LARGEST GLACIAL STREAMS OF THIS MOUNTAIN'S WATER COURSES.

were ice four months of the year, and you could not find a rock the size of a base ball. The old guide thought because I climbed rocks well that he could lead me to a path above the ice seracs, cross the snow *névé* and bring me down a precipice on the other side of the snow field. It entailed a walk of twenty-five miles; but the guide made a mistake. He lost his way down the three mile precipice and to avoid being benighted decided to take me, by glissading, home down the icy bank of the steep glacier. He thought because I could climb rocks well I could slide ice well. Well—I did. I slid so well that to this day I don't know how I didn't carry him 4,000 feet down with me. He had crawled down the precipice to find me foothold. I had stepped from his shoulder to the alpinestock, and from the alpinestock to a niche for foothold, when a bit of icy rock gave way and I shot out to the arm pits above nothing. I don't know how or what my feet found; but I lighted on my feet with a rock slide clattering below me that rumbled and gathered force as it roared below the precipice. Old Jacob came up with a blanched face and took me home over the ice. He would cut a place for his feet, let out the rope, and I would slide till the rope yanked me facing him. Then I would cut a place for my feet and he would slide. It is a point worth noting—in cutting foothold, the Swiss guides always notch in and down—coal scuttle fashion—not in and up, where the feet could slide out. We neither of us missed footing once glissading down; but I fell fifteen times to the second mentally and have hated ice ever since. It was only by a miracle I did not break his and my own neck.

That same week the university men had climbed an unconquered peak. Just as they reached the summit three men unroped and raced to see who should have the honor of placing a flag on the peak first. Snow sagged ominously over a hidden crevasse. A little light man skipped across the bridge of snow in safety. A big Chicago man came next. The snow sagged and sank. His companions saw the snow bridge fold in the middle; and the last thing

seen of the Chicago man was his heels. They looked down the icy blue crevasse. He was wedged shoulders down insensible. An unmarried man volunteered to go down after him. They let him down on the rope. The insensible man was wedged so tightly they almost dislocated his arm pulling him out—the moral of which is, never unrope on snow or ice; and always go at least three on a rope. The only death among mountain climbers in the Canadian Rockies occurred through unroping at the last lap of a climb.

For this kind of climbing, one, of course, must go to Northern Mountains; but you can enjoy sheer height and blizzards, too, far South as Colorado, and in balmy climes as California if you go high enough. People have asked why I like mountain climbing. It is not the dare deviltry of it—it is the conquering spiritual and physical that adds zest to the joy. In these Northern mountains, too, one finds the best of trout fishing and boating.

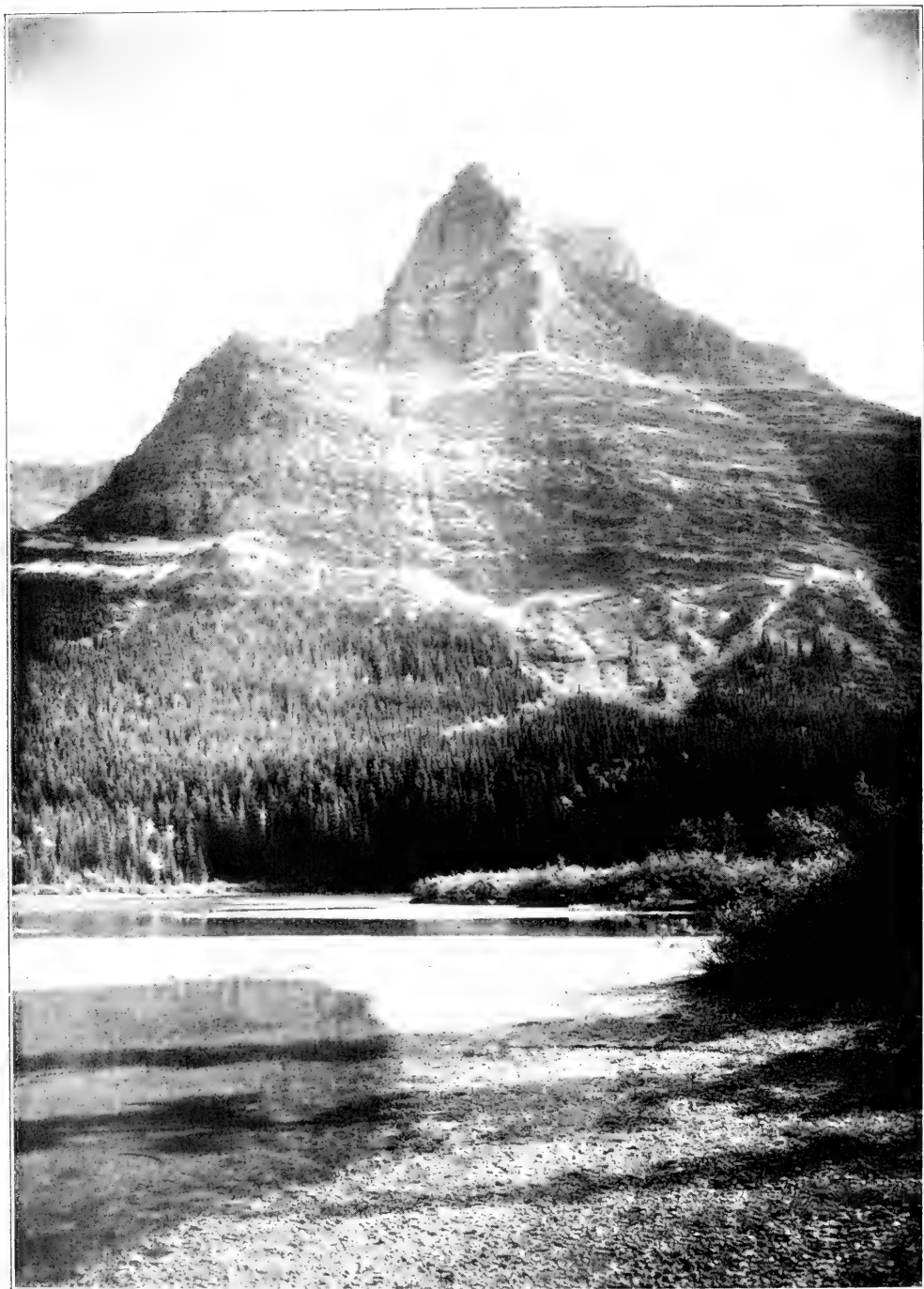
Though my first mountaineering was done in the North, my last has been done in the South; and I confess it is hard to say which is the more fascinating. There is a marvel of color; there is a mysticism as of the soul; there is a peace as of God in the Desert just as there are a grandeur and a robust zest in the North. You don't need to climb mountains in the North unless you want to; and you can see the Desert from a motor car and a palatial hotel if you want to; but there is a better way. Both North and South, you can never feel the wild toss of the unleashed winds, the mystic touch of midnight under stars in Alpine meadows, the secret, furtive, almost fairy, message of the shy mountain flowers—unless you go out and camp far from motor road and hotel luxury. In the Painted Desert I have driven fifteen miles through the lilac bloom of sage brush high as the hubs of the wheels; and I have stopped on the edge of some precipice to make myself realize that the shifting, shimmering panorama of landscape painted in fire below was a fact, not the misty mirage of some dream. Color, color that defies pigments and words, moun-



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McDERMOTT FALLS AND GRINNELL MOUNTAIN.

A PORTION OF MANY GLACIER CAMP ON LAKE McDERMOTT IS SEEN IN THE IMMEDIATE FOREGROUND. THE MOUNTAIN, WHICH HAS AN ELEVATION OF 8838 FEET, IS NAMED AFTER GEO. BIRD GRINNELL OF NEW YORK.



Copyright by Kiser Photo. Co. for Great Northern Ry.

RED EAGLE MOUNTAIN FROM HEAD OF ST. MARY'S LAKE.

THIS MAJESTIC MOUNTAIN WAS NAMED AFTER CHIEF RED EAGLE (MACHIT-OH-CHEE-PEE-TOW) OF THE BLACKFOOT TRIBE. THE LAKE WAS NAMED ST. MARY AFTER THE CATHOLIC ST. MARY, BY OLD HUGH MUNROE, MANY YEARS AGO.

tains blood red with peaks of fire, scene shifted as if by the gods of some great amphitheatre—these are the characteristics of the Painted Desert and Grand Canyon.

The South is, perhaps, the better region for invalids and those who must have a quiet holiday. Don't imagine the Desert is a thing of sand dunes and red mountains. It is that and more. Grand Canyon is 200 miles long. In it lie ranges high as the Canadian Rockies and a river tempestuous as the Columbia. The Desert, too, has its mountains, and its areas of petrified forests—huge sequoias turned to agate and onyx by the centuries' wash—and its prehistoric cities and caves. At the 7,000 foot level in the Desert are the yellow pine forests—God's own hand-made parks, clear of under brush as a garden, tall, towering trees all free of under branching, literally surcharging the atmosphere with steam of resin. This resin atmosphere is of itself sheer healing to weak lungs, though a care must be taken of the altitude for weak hearts.

How to do it—that is the point! Fare West and back by train is much the same as fare across the ocean and back. If you want to see the mountains at closer range than through hotel windows, how are you to do it?

Forest supervisors can send you to little inns higher up the mountains, where you can live at \$1 to \$2 a day. Local outfitters will supply you with tent and camp outfit and horses for

\$4 to \$5 a day; or if you buy your own horse and tent, you can cater for yourself; and this runs about \$10 each a month, if you have a careful cook.

Two or three points should be emphasized:

Do not go into the Desert without a guide; for the Desert is more dangerous than a glacier. A dust storm may wipe out all sign of trail; and lack of water is more perilous than ice or snow.

In the heavy forests of the North do not venture new ground without a guide. You may think you can keep the compass, or find your way out by following sunlight and stream. What if a fog shut out sunlight, and the stream loses itself in a gorge you can't follow? What if you break your leg? I have known of mountaineers, who do not tell about it, reduced to killing their horses for food in such emergencies; and pleasure seekers do not go out seeking emergencies.

Two more points: dress warmly; for the nights are cold even in the Desert. Dress very warmly. Next—officers say that an army is just as efficient as, and no more efficient than, its feet. To enjoy roughing it, you must have boots strong in the ankle, thick and pliable in the sole, boxed enough in the toe to protect the sides of the foot from bruises. Go to the wilds warmly dressed and comfortably shod; and nature will do the rest with distilled sunbeams and ozone and winds sent down from the zenith of heaven!

Fire Losses Small

Although there were an unusual number of forest fires on the national forests of Oregon and Washington this year, the loss of merchantable timber has been relatively small.

Wood for Aeroplane Propellers

The propellers of aeroplanes such as are used in the present European war may be made of selected ash, which is both strong and light and will not split under vibration or shock, or of built-up layers of spruce with mahogany centers. The framework of the machines, too, is generally made of wood, spruce being much used on account of its straight grain and freedom from defects.

For Wood Preservation

A surprisingly large number of substances, ranging all the way from the condensed fumes of smelters to the skimmed milk of creameries, have been tried or suggested as means of preserving wood from decay. Most of them, however, have been found to have little or no value for the purpose. Certain forms of coal-tar creosote and zinc chloride are the most widely used wood preservatives.

FORESTERS IN THE GREAT WAR*

By SAMUEL T. DANA

SOME 40,000 foresters are now, in all likelihood, fighting on the battle fields of Europe. Probably no other profession, aside from the regular officers in the army and navy, has so large a proportion of its members engaged in the struggle, nor will any other profession pay such a heavy toll in men.

It seems to be the irony of fate, one of the many inconsistencies of war, that men who are engaged in one of the most peaceful of professions, whose daily life is spent in the woods and mountains in the protection of the forests and of its wild life, should be among the first to find themselves suddenly involved in a deadly combat, the main object of which is destruction. Yet in Europe there has always been an intimate relation between the forest service and the military service. In the early history of the profession foresters were almost universally appointed from those who had been army officers and soldiers on the theory that their physical constitution and training particularly fitted them for the work; now the case is in part reversed, and foresters are drawn upon, when need arises, to swell the ranks of the army.

Obviously the life of a forester fits him pre-eminently for military service. Out of doors the greater part of the time, he must be physically fit, possessed of a strong constitution, and ready at any time to undergo exposures and hardships that would be beyond the endurance of the ordinary city dweller. Candidates for the forest service in the various European countries must, in fact, measure up to the physical standards that are required for the military service. Furthermore, the very nature of the forester's work is such as to make him sturdy and self-reliant, accustomed to handle a gun, and ready for any

emergency. Moreover, in most of the European countries the lower grades of forest officers are recruited largely from men who have served their time in the army, and this training, together with the semi-military organization which generally prevails, gives them the discipline so necessary in the efficient soldier.



RUSSIAN FOREST OFFICER.

NOTE HOW SIMILAR THIS UNIFORM IS TO THE REGULAR MILITARY UNIFORM OF RUSSIAN ARMY OFFICERS.

* For much of the information contained in this article, the author is indebted to Mr. Raphael Zon and to Dr. B. E. Fernow.



VIEW OF PART OF THE CITY OF NANCY.

NEAR NANCY THERE HAS BEEN ALMOST CONTINUOUS FIGHTING SINCE THE BEGINNING OF THE WAR. AT THE LEFT OF THE PICTURE ARE SHOWN THE GARDEN AND BUILDINGS OF THE FOREST SCHOOL, THE ONLY SCHOOL IN FRANCE FOR THE TRAINING OF TECHNICAL FORESTERS. THE NAMES INDICATING ITS LOCATION WERE WRITTEN ON THE PHOTOGRAPH BY PROF. HENRY, ASSISTANT DIRECTOR OF THE SCHOOL.

The importance in warfare of all these qualities can hardly be exaggerated. Modern war is not, as the present titanic struggle has proved, entirely a question of heavy guns. The man behind the gun is still the most important factor, and it is mainly upon the physical hardihood, the moral stamina, and the enduring powers of the men on the firing line and in the trenches that the final outcome will depend. It is, therefore, perfectly natural that foresters, who possess all of these qualifications in a peculiar degree, should be looked upon by the military experts as too good material not to be put to use in time of need.

The military qualifications of foresters have been especially recognized in France—notably since the Franco-Prussian war of 1870. Previous to the establishment of the forest school at Nancy in 1825, most of the higher forest officials were appointed from retired army officers, but up to the time of the Franco-Prussian war the personnel of the forest administration

did not form a part of the regular army. Events in that war, however, proved conclusively what valuable military service could be rendered by foresters. The subordinate forest officials everywhere voluntarily offered their services and acted effectively as guides and as bearers of despatches between the lines of investment at Strassburg, Metz, Sedan, and Paris. After the first disasters to the French arms, the higher forest officials, unanimously offered to assist in the organization of new corps, and some even joined the ranks of the active army before the mobilization of the new troops could be effected. In a letter of June 30, 1871, to the Minister of Finance, General Cambriels gave the highest praise to the foresters who had served in the war, stating that they had given such striking proof of their courage, patriotism, devotion to duty, and disinterested self-sacrifice as to command the respect and admiration of all.

As a result of the Franco-Prussian war, therefore, a law passed on July 27, 1872, made all forest officers a part of the army, subjected them to military law, and placed them at the disposal of the Minister of War or the Minister of the Navy. In accordance with this

and companies, which formed a part of the regular military force of the nation, both in France and in Algeria. In order to fit the higher grades of foresters to perform efficiently their duties as army officers, an officer from the army was detailed by the Minister of War to the forest school at Nancy to give military instruction. When called to military service, the various higher forest officials assume the following ranks in the army:—

Conservator (conservateur)—Lieutenant Colonel.

Inspector (inspecteur)—Major.

Assistant inspector (inspecteur adjoint)—Captain.

Technical assistant (garde général)—Lieutenant.

Probationary technical assistant (garde général stagiaire)—Sub-lieutenant.

The conservators and inspectors serve in their military grades only as staff officers, or in the quartermaster's department, or on special missions; while the assistant inspectors and technical assistants may serve either as staff officers or as infantry officers in direct charge of companies or sections. The non-commissioned officers of the forest light infantry (chasseurs forestiers) are chosen from among the rangers (brigadiers) and sometimes the guards (gardes). Guards who receive no appointment as subordinate officers are ranked as soldiers of the first class.

For military purposes the forest officers are divided into two classes—(1) those assigned to the defense of the fortresses within their districts, and (2) those assigned to the various sections and companies of the active army. Undoubtedly in the present war the foresters included in the first class have been doing their part in the



JUDEICH, A GERMAN FORESTER.

THIS PICTURE OF ONE OF GERMANY'S MOST FAMOUS FORESTERS, LOOKS MORE LIKE THAT OF AN ARMY OFFICER OF HIGH RANK THAN THE AMERICAN CONCEPTION OF A FORESTER. JUDEICH WAS AT ONE TIME DIRECTOR OF THE AUSTRIAN FOREST SCHOOL AT WEISWASSER AND LATER OF THE GERMAN FOREST SCHOOL AT THIRANDT.

law a decree of April 2, 1875, with various subsequent modifications, created the military corps of forest light infantry (chasseurs forestiers). This decree organized the various higher and lower forest officials into sections

defense of the fortifications in the war zone, while those in the second class have probably been used largely for reconnaissance work. This work, which has been steadily increasing in importance and difficulty, is one which foresters are especially qualified to perform, and in connection with it they have undoubtedly rendered valuable service as guides and scouts.

Germany, Austria-Hungary, and Russia have not gone so far as France in making the forest organization an integral part of the army. In Germany the bulk of the higher forest officers are merely subject to the compulsory service which may be required of all able-bodied citizens in accordance with the general military laws. Some of these higher officers do, however, voluntarily become a part of the army as guides or couriers (*feldjäger*). In Prussia the "*feldjägerkorps*" consists of about seventy-five forest officers who receive the same education as other foresters but in addition have military organization and are from time to time assigned to duty in Berlin. The origin of this

corps dates from the time of Frederick the Great, who conceived that foresters could find their way through the wilds better than any other men. In times of peace the members of the corps are still used for such duties as transferring despatches between the different courts.

The lower forest officers, on the other hand, are much more closely connected with the army through the organization of special "*jägerbattalions*." Foresters belonging to these battalions owe not only the usual military service required of every one, but are subject to certain special military obligations. Candidates for the lower grades in the forest service, after serving an apprenticeship in forestry work and undergoing from one to three years of military training, must pass an examination known as "*jägerprüfung*." If successful in this they are recommended for appointment in one of the "*jägerbattalions*," which are organized as part of the regular army. In connection with their military service they are specially trained as sharpshooters and also receive instruction in forestry from competent fores-



AUSTRIAN FOREST SCHOOL STUDENTS.

NOTE PARTICULARLY IN THIS GROUP THE MILITARY UNIFORMS AND THE GENERALLY SOLDIER LIKE APPEARANCE OF THE STUDENTS.

ters. After several years of service in this corps, during part of which time they may be granted leave of absence in order to take part in actual forestry work, they are eligible for appointment to the forest service. The object of this training is evidently to secure men of good physique and of certain moral and intellectual attainment for the

given as a part of the training at a regular military school. In 1867, however, the forest service began to be transformed from a military to a civil organization, and since that time the higher officers, at least, have as a rule not been men trained primarily for military service. The lower officers, such as guards, however, are still recruited as far as possible from those who have already passed the military service to which all able-bodied citizens are liable, and particularly from those who have served as non-commissioned officers.

While it is impossible to state exactly how many men are included in the State forest services of the warring countries, a rough estimate of their total number is as follows:

	Higher Grades	Lower Grades	Total
Russia.....	3,500	31,000	34,500
Germany.....	1,500	7,800	9,300
Austria-Hungary	1,000	6,600	7,600
France.....	700	3,800	4,500

France also has some 600 forest officers in its province of Algeria, many of whom are undoubtedly engaged in the war. Belgium, with only 450,000 acres of State and communal forests, has only about 150 foresters in its State service. In Servia and Turkey forestry has not as yet been developed to any extent, and the number of men employed is undoubtedly very small. England itself has practically no State forests and only a few foresters in private employ. In British India, however, a large force is employed for the handling of the 149,000,000 acres under the management of the forest department. Canada also has a moderately large and steadily growing forest force, and foresters from both of these countries are certainly fighting for their mother country.

In round numbers, then, there are probably in the neighborhood of from 55,000 to 60,000 foresters employed by the Governments of the various countries and their provinces engaged in the present war. Of these it can safely be assumed that from two-thirds to



A RUSSIAN COSSACK.

NOTE HOW CLOSELY HIS UNIFORM RESEMBLES THAT OF THE FOREST OFFICERS.

forest service, and at the same time to make them available for military service.

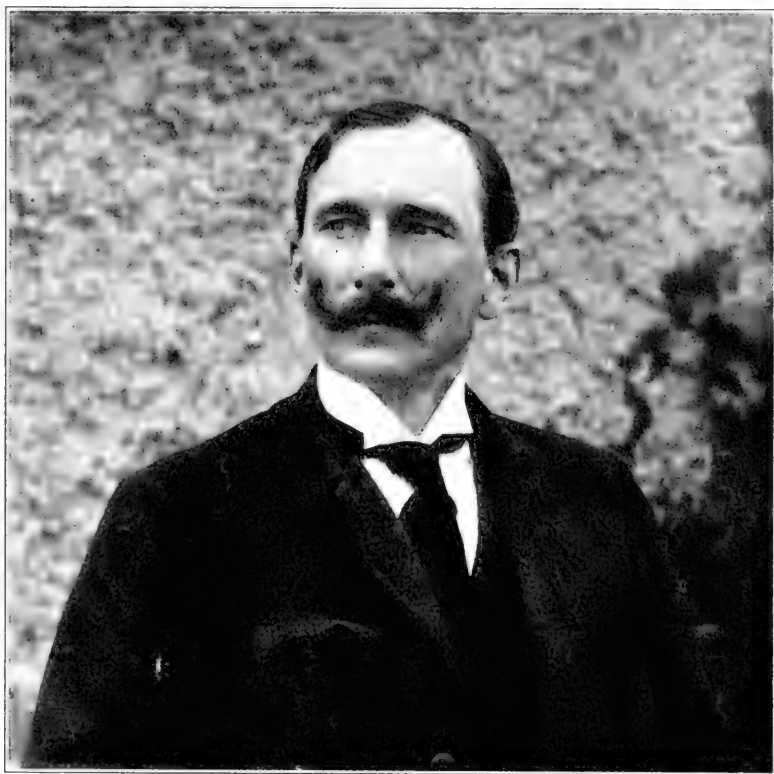
In Russia both the upper and lower grades of forest officers were for many years recruited directly from the military service. In 1837 the first technical forestry education in the country was

three-fourths, or some 40,000 men, are actually taking part in the fighting. It must also be remembered that there are a very considerable number of foresters in private employ, many of whom must also be involved.

The fate of many European foresters now fighting for their respective countries will be watched with the keenest interest by foresters in the United States. The connection between the forestry profession in the Old World and the New has always been a close one, and many of the men who have been instrumental in shaping the forest policy and introducing the methods of forest management now practiced in this country, such as B. E. Fernow, Gifford Pinchot, Henry S. Graves, Overton W. Price, and Filbert Roth, received their forestry education in Europe. Recently American foresters have been

visiting Europe in constantly increasing numbers, and have formed personal acquaintances with their professional brethren on the other side of the water, many of whom are now undoubtedly with the various armies.

Of all the foresters engaged in the war, Americans are undoubtedly most interested in Dr. C. A. Schenck, who has for many years been a reserve Lieutenant in the Light Artillery of the Grand Duchy of Hesse-Darmstadt, and concerning whose fate rumor has already been busy. Coming to the United States twenty years ago to succeed Gifford Pinchot as forester to the Biltmore estate of George W. Vanderbilt, at Asheville, N. C., Dr. Schenck's brilliance and thorough knowledge of forestry soon made him one of the prominent men in the profession. The Biltmore Forest School, which he estab-



DR. C. A. SCHENCK.

THE HEAD OF THE RECENTLY DISBANDED BILTMORE FOREST SCHOOL, WHO WAS POPULARLY KNOWN IN THE WORDS OF A SONG WRITTEN BY ONE OF HIS BILTMORE STUDENTS AS "THE MAN WHO LOOKS LIKE THE KAISER." DR. SCHENCK HAS BEEN FOR MANY YEARS AN OFFICER IN THE GERMAN ARMY.



RUSSIAN FOREST GUARD.

NOTE THE UNIFORM AND THE CONSPICUOUS BADGE AS WELL AS THE ARRAY OF TOOLS IN GENERAL USE BY FORESTERS IN RUSSIA FOR FOREST PLANTING.

lished in 1898, was almost the first forest school to be founded in this country, and throughout its existence remained a unique institution. Nearly a year ago, however, feeling that the school was not filling the place which he had always hoped it might, he decided to discontinue it and to return for good to his old home in Darmstadt. From his first arrival in this country Dr. Schenck's virile personality made itself strongly felt, and his loss would be sincerely mourned by foresters and lumbermen generally should he fall a sacrifice in the present war.

Reports of individuals who have been killed in battle are naturally slow in reaching this country, but on November 13 a brief news despatch announced the death of Professor Fricke, one of the foremost German foresters and for several years past director of the forest

academy at Münden, where Dr. Fernow, now Dean of the Faculty of Forestry at the University of Toronto, studied forestry. Prof. Fricke has been a frequent writer on mensuration and silviculture, and is probably best known in this country because of his efforts to show that tolerance is sometimes, at least, as much a matter of available moisture as of available light. His investigations of this subject not only aroused European foresters to the necessity of looking down as well as up in their studies of tree development, but did much to give a new direction to investigations along this line in this country.

While American foresters have lately acquired a better understanding of the scientific work of Russian foresters, and have even formed ties of friendship with those who have visited this country,



FRENCH FOREST RANGER AND HIS WIFE.

THE MILITARY APPEARANCE OF THE COAT IS AT ONCE APPARENT. IT IS BUT SLIGHTLY DIFFERENT FROM THE UNIFORM OF THE FRENCH MILITARY OFFICERS OF MINOR RANK. THE HOUSE IN THE BACKGROUND IS OWNED BY THE GOVERNMENT AND IS A TYPICAL FRENCH RANGER STATION.

the many exemptions from military service granted to educated persons in Russia make it difficult to state definitely who of them are now at the front. There is no doubt, however, that many foresters are in active service for their country.

Another German forester who in all probability is involved in the strife is Prof. Fabricius, a comparatively young man who has been in charge of the work in silviculture in the forest school at Munich since the death a few years ago of Prof. Mayr, under whom many American foresters have studied.

Among the prominent French foresters who are placed at the disposition of the Minister of War as members of the "chasseurs forestiers," and who are therefore undoubtedly involved in the war, are Cuif, Jacquot, and Cardot. Cuif is associated as a professor with Jolyet at the forest school at Nancy, where they are in charge of the research

and experimental work. Nancy has been one of the main storm centers since the beginning of the present war, so that any French foresters who have been involved in the operations in its vicinity have been fighting for their school as well as their country. Gifford Pinchot first undertook the study of forestry at this school, which has since been visited also by other American foresters. Jacquot is best known to foresters in this country as the author of an exhaustive book on the valuation of forest fire damages (*Incendies en Forêt*) which was awarded a gold medal. Cardot has written extensively on forest influences and the reclamation of denuded mountain lands, and has also done much to arouse public interest in forest preservation by the publication of a popularly written, attractively illustrated book known as "*L'Arbre*."



GROUP OF FORESTRY STUDENTS.

THESE MEN ARE FROM THE FOREST ACADEMY AT MÜNDEEN, OF WHICH PROF. FRICKE WAS DIRECTOR.

Among the Austrian foresters who are probably with the army may be mentioned Prof. Zederbauer, who is in charge of the silvicultural investigations at the Mariabrunn Experiment Station. Zederbauer has written widely on silviculture in many of its phases, but is best known in this country for his interesting investigations regarding the light requirements of trees and methods of measuring light in the forest.

In conclusion it is interesting to speculate a little as to the effect which the war will probably have on the future development of European forestry. Many forests will undoubtedly be seriously injured and even destroyed, working plans will have to be revised, and opportunities will be offered for the introduction of new silvicultural systems and methods of forest management.

Perhaps of even greater importance, however, will be the heavy thinning which will take place in the ranks of the foresters. Strange as it may seem, this loss will probably in some respects be particularly serious in Russia. There the proportion of forest officers in the higher grades to those in the lower grades is only about half what it is in Germany, Austria-Hungary, and France. The death of any considerable number of the higher officers, therefore, will decrease the comparatively small number of leaders in the profession. In the other countries, on the other hand, both the higher and lower grades are overcrowded, and there are more men ready for service than there are positions to fill. The war will therefore make room for many men who would other-

wise have no chance to attain positions of responsibility. Deplorable as is the destruction of forests and foresters which the war will cause, there is, however, hope that some good may come in the long run. The introduction of

new blood which will be necessary, and the opportunity for original work in repairing the damage to the forests, may be expected to give a new stimulus to the profession in which at present practice lags behind theory.

THE NATIONAL FOREST ADMINISTRATION*

By DAVID F. HOUSTON, *Secretary of Agriculture*

[A change in administering the national forests in undeveloped sections is recommended by Secretary of Agriculture Houston in his annual report, so that they will yield, at once, revenue that can be applied to local development and thereby further assist settlers and inspire settlements. This plan is for Congress to provide money in advance for local improvement, especially road construction, and charge this against a county's share of timber sales when the timber is sold by the government. The Secretary's recommendations are in part given in the following extracts from his report—Editor.]

“IN regions where timber is the chief income-producing resource absence of demand for it often works a serious hardship upon those who have entered the region as the advance guard of civilization and are seeking, in the face of many difficulties, to establish homes. There are counties in which a sparse local population of pioneer settlers find themselves surrounded by a wilderness largely consisting of national forest land, which is almost idle so far as any form of present use is concerned. In other words, a great, if not the greatest, of the potential sources of wealth in such counties, held in trust by the Government for the benefit of the public, not merely contributes nothing now to the upbuilding of the communities which will give value to the forests, but actually adds to the burden which these communities must assume. Were the forests private property they would pay their fair proportion of the cost of road development, public schools, and other public activities, through taxation. The Government, unlike the private owner of timberland in such regions, is holding the timber, not in order to make a profit later by its advance in value, but in order to make it promote the public welfare. That it should be made to serve the local as well as the national public welfare has been definitely recog-

nized in the provisions of law for the use of 35% of all gross receipts from the forests for local public purposes.

“To carry more fully into effect this already established principle a further step should be taken. It should not be necessary to wait until the period of hardest struggle is past before these public resources begin to assist local development. Before the national forests begin to yield large incomes, as well as after, they should be made to participate in the work of building up the country and giving value to all its resources.

“The first need of the public in undeveloped regions is for more and better roads. Without them the struggle of individuals to gain a foothold is much more difficult, while isolation from neighbors and the outside world means meager educational opportunity, a lack of comforts, and conditions unfavorable to community life. A road system, however, constitutes a capital investment which a handful of settlers must make a little at a time. When their roads must be built largely through national forest lands, which pay no taxes, their case is much more difficult. In such regions the Secretary of Agriculture should be authorized to make a study of the local conditions and to gather all the data necessary to formu-

* From the annual report of Hon. David F. Houston, Secretary of Agriculture.

late a plan for public-road development based on local needs. These plans should be carried into sufficient detail to provide a reasonably accurate estimate of the cost of the road construction which it is proposed that the Government shall undertake. They should be accompanied by careful and conservative appraisals of the value of the national forest timber in each locality and a forecast of the future income which the forests will bring in from all sources. On the basis of the showings of fact regarding the value of the Government's property, its potential income-yielding capacity, and the needs of the public, Congress should be asked to appropriate for the construction of specific projects recommended by the Secretary of Agriculture. The cost of such road construction by the Government should constitute an advance of the amounts which the forests would later make available for local use. In effect, therefore, the roads would become an obligation upon the forests, to be extinguished as their resources come into commercial demand."

EXCHANGES OF LAND WITH STATES

The Secretary then recommends changes in the system of homesteading, and suggests the wisdom of releasing certain parts of the forests by exchange of property with the States, as follows:

"An important part of the forest problem is to get the right line drawn between farm and forest. Under private ownership considerations enter which do not always lead to the best use of the land. On the national forests the question is determined by a careful study of what the land is best fitted to produce and what the public most needs. Agricultural development is provided for either by excluding from the forests land chiefly valuable for other than forest purposes or by listing land for settlement under the forest homestead act. The work is carried out through land classification, which was aggressively pushed last year. The elimination made or determined upon totaled over 2,000,000 acres, while systematic classification was conducted on 100 of the forests, and over 280,000 acres of

land were listed for settlement under the forest homestead law. The area in the forests at the close of the year, exclusive of land not the property of the Government, was slightly over 165,000,000 acres.

"There is need for similar classification work outside of the national forests wherever the public domain is timbered. There are still many areas which should be added to the forests. Wherever the land will have largest permanent value through use for forest production it should be held in public ownership. Timbered portions of the public domain are now unprotected against fire and trespass and are often a source of danger to adjacent lands. Under existing law the President has in the seven States of California, Oregon, Washington, Idaho, Montana, Colorado, and Wyoming no authority to add such lands to the present national forests. Legislative provision should be made for applying the classification principles in these States.

"There is also need for legislation to permit the consolidation of national forest holdings through land exchanges with States and private owners. Some of the forests contain a great deal of land which was acquired from the Government before the forests were established. Exchanges of land on the basis of equal values would be very advantageous to the Government, since the cost of administration and protection would be materially reduced."

TIMBER SALES

The report outlines the policy of the department regarding timber sales in the national forests as follows:

"In its handling of timber sales on the national forests the department is confronted with a situation radically different from that which obtains with respect to the grazing. While almost all the range on the forests is in demand, most of the timber is not. To a large extent development work here means so handling the timber that it will be an important factor in opening up the country. Wherever and whenever general business and market conditions make it possible to sell large bodies of now inaccessible timber, the aim is to

offer the timber on terms which will tend to increase transportation facilities, promote settlement, and build up permanent communities. Where timber can be sold the benefits of Government management of the forests as public resources are apparent now. Where, however, the timber is not in present demand a difficult situation sometimes exists.

"It has been urged that, with the vast supplies of virgin national forest timber, the Government should greatly increase its sales by lowering the price asked for stumpage. To the extent that such a course had any effect at all it would be, in the long run, an effect unfavorable to the public interest. Upon the greater part of the timber it would have no effect, because no manufacturer could, under present conditions, afford to cut the timber at any price: Where timber is thus not in demand because still inaccessible, as a rule the possibility of marketing it depends on the advent of a period of greater activity in the general lumber trade. When, as at the present time, lumbermen are forced by general market conditions to curtail output, the department can not expect to make many large sales. Nevertheless, it is wise even in such times not to cease offering large bodies of timber on terms which may attract purchasers, and this is being done. At the same time all

possible effort is given to develop small sales for the supply of local needs, and sales to industries which require wood for special purposes, since sales of this character provide a fairly steady market for national forest stumpage, even when the general market is depressed. In a word, the timber-sale policy, no less than the grazing-regulation policy, aims to make the resource serviceable to the public now, as well as in the future, in the fullest degree which scientific production and utilization can make possible."

In the section dealing with forestry the Secretary also points out that the forests have passed through an unusually dry and dangerous summer without serious fire damage. He indicates that the present emergency fund of \$100,000 for fire protection of one billion of dollars of public property is inadequate even in ordinary seasons. In discussing the recreational use of the forests, which he holds to be the chief of their secondary uses, he urges that the department should be enabled to grant term leases to persons wishing to use the land for summer homes or hotels. He also emphasizes the importance of protecting the watersheds in the forests, so that the water supply of the 1,200 communities supplied from this source may not be polluted.

THE ANNUAL MEETING

The annual meeting of the American Forestry Association will be held on Monday, January 11, in New York City at the headquarters of the Merchants Association of New York, Woolworth Building, 233 Broadway.

The sessions will be at 10 a. m.; 2 p. m., and 7 p. m.

This is a departure from the usual custom of holding the meeting in Washington, D. C., the change being made because New York is more accessible to the many thousand New England, New York, Pennsylvania and New Jersey members than is Washington, and because members of the Society of American Foresters and of the Society of Eastern Foresters will assemble in New York on the same day.

The meeting will consist of a series of addresses and discussions on what the American Forestry Association can do to aid during the coming year in national, state and private forestry and in encouraging the use of forests for recreation. There will also be discussion of measures for aiding by careful investigations of conditions affecting them, and otherwise, the lumbermen, timberland owners and pulp and paper interests. It is proposed to make the meeting an eminently practical one, one at which the addresses and discussions will be of great service in outlining the important work of the Association for the coming year.

The complete program will be announced in the January American Forestry Magazine.

Members of the Association and their friends are requested to attend and to participate in the discussions.



TRADING SCHOONERS ON THE BEACH AT PAPEETE.

THIS WAS THE TOWN ON TAHITI ISLAND WHICH WAS ON SEPT. 22 SHELLED BY THE GERMAN CRUISERS GNEISENAU AND SCHARNHORST. THE 4000 RESIDENTS FLED TO THE HILLS.

TAHITI

By E. T. ALLEN

SHORTLY after day break, September 22, the German cruisers Scharnhorst and Gneisenau appeared outside the coral reef that guards the little palm-fringed harbor of Papeete. An hour or two later they steamed away, leaving only smoking ruins to mark what had been the main portion of the romantic South Sea capital immortalized by Melville, Loti, Stoddard, Stevenson and a score of lesser writers. Unfortified and undefended, except for a handful of men kept for island police duty, sleepy picturesque Tahiti found her isolation and innocence no safeguards against a world war. The port's native population of 4,000 was driven terrified to the hills. As it was the trading center as well as the

capital, of French Oceania, and the bombardment destroyed stores and warehouses, whole archipelagoes were left stricken and in want.

Since this episode aroused mutterings throughout the world because all the allies' navies were apparently unable to protect defenceless ports against three or four roving and merciless German warships, the name of remote Tahiti has met more eyes than since "Otaheite" was first described by enthusiastic voyagers nearly 150 years ago.

Tahiti, the largest island of the Society Group and by many travelers believed the most beautiful in any sea, lies nearly south of Hawaii and about 17 degrees south of the equator. First touched by Portuguese and Spanish



TANTERA, NEAR STEVENSON'S HOME.

STEVENSON LOVED THE BEAUTY OF THIS PLACE AND HIS DESCRIPTIONS, WONDERFUL AS THEY ARE, FAIL TO DO IT JUSTICE, BUT FAIL ONLY, BECAUSE NO WORDS OF TONGUE OR PEN COULD ADEQUATELY DESCRIBE IT. BOUGAINVILLE, A FAMOUS FRENCHMAN, SAID OF IT, "I THOUGHT I WAS WALKING IN THE GARDEN OF EDEN."

navigators, it was described to Europe by Wallis (1767) and Bougainville (1768). They gave such a lively account of the beauty of both island and people, and of what they considered the idyllic perfection of its semi-wild, semi-developed society, that much was written, especially in philosophical France, to argue that here was proof of the necessity for return to nature by the human race.

Bougainville named it New Cytherea. His companion, the naturalist Commerçon, called it Utopia and wrote extravagantly of the virtues which he said flourished because the natives had no conventional restraint. Diderot wrote imaginary dialogues between Tahitian philosophers and ship's chaplains, proving the immorality of marriage. In England, Hawkesworth embroidered Wallis' reports of the newly-discovered Paradise until Horace Walpole denounced him for his sentimentality. By

some authorities it is believed that these early reports of the remarkable island, corroborating the theories of Rousseau, actually influenced the French Revolution and thus all Europe.

Cook's and Forster's visits soon followed (1769 to 1774), bringing fuller information, and in 1788 England sent Lieutenant Bligh in the *Bounty* to get bread-fruit for introduction into her tropical colonies. How his crew mutinied later, put back to Tahiti, sailed from there again with a party of native men and women, and disappeared from the world until found long after on Pitcairn Island where they founded an isolated colony that exists today, is perhaps better known than any other episode in Polynesian history. On the whole, England seems to have been more skeptical than France concerning Tahitian manners, for her next step was to send missionaries to improve them.



A MOUNTAIN STREAM.

A TYPICAL SCENE IN TAHITI OF THE SOCIETY ISLANDS GROUP IN THE SOUTHERN PACIFIC, OWNED BY THE FRENCH AND RECENTLY BOMBARDED BY THE GERMAN CRUISERS. NOTE THE EXTREMELY HEAVY VEGETATION.



COCOANUT TREES ON TAHITI ISLAND.

COPRA, WHICH IS A DRIED COCOANUT MEAT FROM WHICH AN OIL IS EXPRESSED THAT HAS COUNTLESS USES FOR SOAPS, COSMETICS AND FOOD PRODUCTS, IS THE CHIEF SOUTH SEA ISLAND COMMODITY.

The social system of Tahiti and neighboring islands of the Society Group, which Europe first lauded and later destroyed, was a peculiar one and by no means wholly barbarous. It was very similar to that of Europe in the Middle Ages. There was no king, but each district or chieftaincy had an independent ruler who inherited under the law of primogeniture and traced his descent by a most carefully-kept genealogical system to almost incredible antiquity. These nobles had courts containing heralds, astronomers, jesters, minstrels, priests, and indeed nearly all the retinue of a feudal barony. Athletics, dancing, and music, the last quite highly developed, were the common pastimes. Navigation was a science. Tahitian voyagers sailed thousands of miles to Hawaii and New Zealand, without compass; indeed the Maoris of New Zealand are now generally believed

to be a race resultant from the conquest of an aboriginal savage race by Society Island war chiefs who colonized and carried their customs and religion. War was both pastime and vocation, for quarrels between clans were incessant, but was much in the nature of duels or tournament. Cause was declared and the victor withdrew after honor was satisfied. Conquered territory was never held. On the whole the people were social, gay, and pleasure-loving to a degree which has given them a rather bad reputation with conventional moralists. Of Aryan ancestry, practically or wholly escaping Mongol or Negroid infusion by their exodus from the mainland in the remote past, they were and are still about what would be expected of a people much like Southern Europeans but who have been isolated for ages under all the passionate influences of the tropics.



A TAHITIAN ATHLETE.

THE NATIVES HAVE INHERITED SPLENDID PHYSICAL DEVELOPMENT FROM THEIR WARLIKE AND ATHLETIC ANCESTORS. THE MEN ARE OFTEN OVER SIX FEET TALL AND WONDERFULLY MUSCULAR.



FISHING GIRLS AT TAHITI.

THE SEA ALWAYS PROVIDES FISH, AND THE LAND FRUIT, AND IT REQUIRES BUT LITTLE EXERTION TO GET ENOUGH TO EAT.



HOUSE BUILT BY EUROPEANS.

A RESIDENCE NEAR PAPEETE, THE ONLY TOWN IN TAHITI. THIS IS A THATCHED DWELLING, WITH A PORCH AND FAR BETTER FITTED FOR COMFORTABLE LIVING THAN THE NATIVE HOUSE.

To such a people, who welcomed the white man with every hospitality, his weapons, liquors and religion soon proved bewildering. By the time the missionaries arrived in 1797 they found English firearms aiding a single chief to subdue his neighbors with the new European idea of kingship. Throwing in their lot with him, as probably their strongest protector, they aided this ambition. Tahitian history during the first 30 years of European influence can perhaps be best epitomized by a comparison of the population of 150,000 which Cook found with the population of about 10,000 which survived. Step by step the resentful nobles were driven back, measles took a frightful toll, and in 1815 the chief who had been fortunate enough to command gunpowder established a dynasty which continued until the island was finally taken by the French after several decades of squabbling by various European interests.

During the heyday of the whaling industry Papeete was a popular rendezvous. Herman Melville's "Omoo" describes his adventures in Tahiti as an escaped mutineer from a whaleship that touched there, although it is far less creditable than his more famous "Typee" and "Moby Dick." As South Sea trade in copra, shell and pearls developed, the port began to assume importance as its principal center. The Marquesas, the Paumotus or Law Archipelago, the Gambiers, the Austral group, Manahiki, Easter Island, and other less known palm-clad and surf-beaten islands came to support a fleet of picturesque schooners of the "Currency Lass" type Stevenson loved so well to describe. Papeete beach, where the sorry adventurers of "The Ebb Tide" pooled their misfortunes and Captain John Davis performed for his breakfast on just such a vessel as may be seen there in numbers today, is elo-



A NATIVE HOUSE ON THE BEACH.

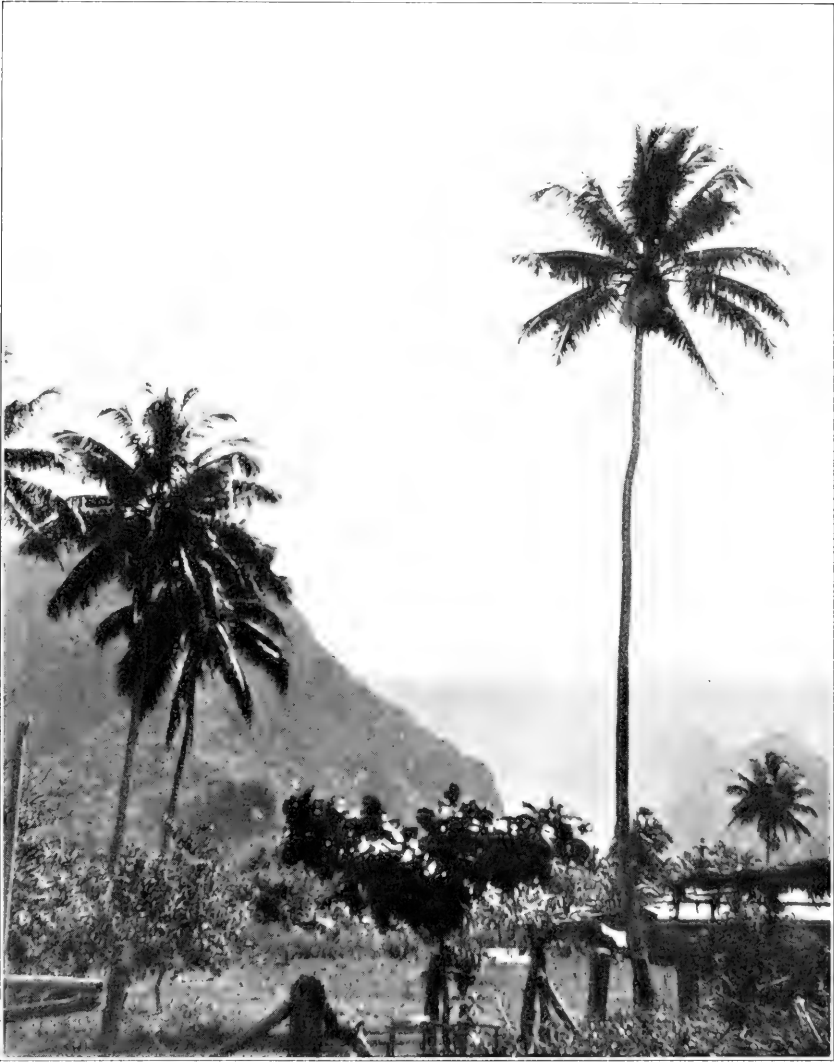
THERE IS ALMOST A CONTINUOUS SETTLEMENT ALONG THE BEACH FRONT AROUND THE ENTIRE ISLAND, THE HOUSES BEING ERECTED IN GROVES OF COCOANUTS, BREADFRUIT, MANGOES, ORANGES, BANYANS, AND BAMBOO.

quent of pearls and divers, blackbirding and piracy, typhoons, wrecks, and all the adventures of beach and lagoon that make up South Sea history.

Yet so charming a scene hardly befits such themes. Rainbow colored fish play through the coral along the very seawall at your feet, the placid green lagoon meets a skyline of palms on either hand, and seaward, beyond a tiny palm-covered islet where a queen once had her fortress, the surf rolls creaming on the barrier reef from the blue tropical ocean, rippling in the soft fresh Trades. Behind the town, itself hidden in verdure, green slopes rise quickly to splintered volcanic peaks nearly 8,000 feet high, carved by precipitous valleys with countless flashing waterfalls. Melville wrote that the ineffable repose and beauty of the Tahitian landscape was such that every object struck him like something seen in a dream and he could scarcely believe

such scenes had real existence. "Often," said Bougainville, "I thought I was walking in the Garden of Eden."

Papeete is the only town, but the fertile level shores of the island are so thickly populated as to form almost a continuous village along the road that skirts the beach for its circumference, of nearly 100 miles. Yet there is practically no open land except in the uninhabited mountains. Houses and villages are beneath endless groves of cocoanuts, breadfruit, mangoes, oranges, banyans and bamboo, with occasional ornamental exotics from other tropical lands. Alligator pears, native "chestnuts," mummy-apples and bananas, are in almost every dooryard. Except for two small sugar plantations, a few half-hearted cotton patches, and small clearings for taro, yams and other vegetables, there is no farming as we know it. Copra and vanilla are the island crops.



ONE OF THE RARE OPENINGS IN THE FOREST.

GREEN SLOPES RISE QUICKLY BEHIND THE TOWN OF PAPEETE TO SPLINTERED VOLCANIC PEAKS NEARLY EIGHT THOUSAND FEET HIGH, CARVED BY PRECIPITOUS VALLEYS WITH COUNTLESS FLASHING WATER FALLS.

Copra, which is dried cocoanut meat from which an oil is expressed that has countless uses for soaps, cosmetics and food-products, is the chief South Sea commodity. Hundreds of islands have practically no other trade. Indeed the cocoanut has no rival among trees for all round usefulness. Its fruit supplies food, drink and money. It feeds pigs and chickens with no labor beyond splitting the fallen nuts. Its leaves

furnish building material and sleeping mats; the nut husks are excellent fuel. Dominating the landscape by its individuality and grace, it appeals to the forester as the king of trees.

Vanilla, of which Tahiti furnishes perhaps a third of the world's supply, is also largely grown in the forest, the vines climbing rooted and growing poles in partial shade. The hermaphrodite flowers are "married" by deft native



BATHING IN THE VILLAGE STREAM.

THE MEN, WOMEN AND CHILDREN IN TAHITI ARE THE MOST ADEPT SWIMMERS IN THE WORLD. THEY LEARN TO SWIM AS CHILDREN AND SPEND MUCH OF THEIR TIME BATHING AND FISHING.

girls and the bean-like pods cured by hand by a delicate process requiring several months.

Diving for pearls and mother of pearl shell is not carried on at Tahiti but on neighboring atolls for which it is the outfitting and trade center and the diving season is one of great interest and excitement.

On the whole, however, industry has small part in the daily life of the inhabitants. Very little work suffices to procure all that is essential where nature supplies food and shelter. The writer once asked a native to bring him some fish. "Why don't you catch your own fish?" was the response. "That isn't the question; I'll give you a dollar for a good string of fish," was parried. The answer to this was unanswerable and final: "I don't need any dollar." Such is island philosophy. The sea will always provide fish, the land all other actual requisites, and since this will be

as true in the future as today, why trouble to lay up for one's children? Even tobacco and coffee are home-grown, so only imported luxuries require effort to obtain. Most of the real work of the island, such as curing vanilla, is done by Chinese who value money for its own sake. They bake the bread, run the restaurants, and own most of the small stores.

Nevertheless the natives are splendid people physically, no doubt an inheritance from their warlike and athletic past. The men are often well over six feet and tremendously muscular. The women are erect, graceful, beautifully formed, and often very handsome. Their brown eyes are unusually fine; their black hair long and waving. Polynesian races differ slightly in color, that of pure Tahitians varying also with caste and exposure, but the commonest type is an olive-gold not darker in shade than the skins of Chinese and



A TAHITIAN CANOE.

THE CANOES HAVE GRACEFUL LINES AND THOSE BUILT FOR RACING ARE INCREDIBLY FAST. THEY ALSO HAVE SAILING CANOES WHICH CARRY AN IMMENSE SPREAD OF CANVAS, AND ARE TRIMMED BY THE GYMNASTICS OF THE CREW WHO BALANCE THEMSELVES ON LATERAL SPARS EXTENDING FROM THE SIDES.

Japanese but warmer and less yellowish. Their features are pleasing and contain nothing Negroid or Mongolian.

The typical native dress is the pareu, a bright-colored patterned cotton cloth much like the Burmese sarong, twisted by the men around the waist and by the women around the breast. The latter, however, rarely wear it away from home, except when bathing or fishing, without a loose overdress. The men also are more and more coming to regard the pareu as informal, comfortable for home and work wear, but to be replaced by coat and pants on dress occasions. These customs vary much with the distance from town. Flowers constitute the chief adornment, worn in wreaths and singly over the ear. Carriers come in from the mountain valleys with loads of plantain, naked except for a loin cloth but with garlands of ferns and flowers.

The chief Tahitian characteristics are social. Feasting, dancing and singing are always in progress, usually on a wholesale scale. The entire village participates on the slightest excuse. Anything that can be done alone is unpopular. Even in fishing, the single venturer is regarded as a pot-hunter and no sportsman, the gentlemanly way being to set a net in the lagoon and invite the neighborhood to a drive affording much noise and frolic, or to organize a deep sea expedition for albacore. In several stays on the island the writer was never allowed to fish with hook and line from a single canoe because, while all right for a commoner who needs fish, it is not the thing for "quality" to do. The visitor is struck with the invariable good nature of the people. They rarely quarrel, drunk or sober. Violence is practically unknown. Murders are so infrequent as to be little

more than traditional and even fighting is extremely rare.

Like all Polynesians, they are wonderful swimmers, and probably excel all others as canoeists. Whereas in Hawaii the canoes seen today are purely utilitarian, the Tahitian retains his navigating ancestors' love for naval architecture. Racing canoes carrying twenty paddlers or more are built with great ceremony and beating of drums and carefully kept from the weather in houses constructed by the district. These canoes have beautiful lines and are incredibly fast. So are also the sailing canoes, which carry tremendous canvas and are trimmed by the gymnastics of the crew who balance themselves on lateral spars extending from the sides. They also have outriggers, but in racing these are not allowed to bury themselves and so impede progress.

In several visits, with intervals of years between, the writer has observed some change in dress and customs due to the inroads of "civilization." Return after one four years absence to find a moving picture show near one of the

ancient chiefties was a disillusionment. But it will be long yet before modernity makes any conspicuous alteration in the palm-fringed skylines and surf-bound lagoons of Tahiti, or more than veneers the careless kindly nature of its people. To the traveler who wishes to see the tropics at their loveliest, to swim and fish and idle where no newspapers and telegrams remind him of his troubles, it will offer no disappointment unless he expects to survey the primitive with all the civilized luxuries of Palm Beach also at hand. To make the most of it he must leave the port and live a simple life with many petty annoyances. If he is willing to do this, without insisting upon his own ways or patronizing a people who are as sensitive as they are kindly, he will be excellently treated.

No attempt has been given in this article to discuss commerce, government, business opportunities, or other like phases which might be important from certain standpoints. The bombardment of September 22 is too recent and significant.

BUYING HANDLES BY WEIGHT

THROUGH new specifications for ax, sledge, adz, pick and other hickory handles, the Panama Canal authorities have recently purchased large quantities of this class of material for one-fourth less than formerly paid, and at the same time are getting just as serviceable stock.

The war department and the navy department, as well as the Panama Canal commission, have adopted these specifications, which were prepared by the forest service primarily for the use of the various branches of the federal government. Subsequently, however, they have been approved by the trade, both manufacturers and dealers, and adopted by several of the leading railroads.

The new rules are the result of a long study of the subject, covering exhaustive strength tests, investigations of the growth of hickory in the woods, processes of manufacture, and market conditions. Under the new specifications handles are selected according to weight, as influenced by the density of the wood, and they now include material which may be either partly or wholly of heartwood, known generally as red hickory. Red hickory was formerly discriminated against in commercial grading, but it is now accepted, since it has been found that weight for weight, it is just as serviceable as the white hickory. Handles which contain small sound knots or bird pecks, so located as not to affect the strength, are also accepted.

THE EUROPEAN WAR AND THE LUMBER TRADE

By R. C. BRYANT

Professor of Lumbering, Yale University

DURING the early days of the European war, many expressed the conviction that all forms of business in the United States would profit to some extent because of the disturbance of the commerce of the belligerent nations. The war has now progressed far enough to show that, with the exception of a few industries, this benefit will be deferred for some time at least and that the losses sustained in the meantime through the disturbance of our own business conditions may prove greater than any future gains.

The lumber industry, the third among our great industries in point of money invested, is undergoing a period of depression such as it has not experienced for some years, due, in large measure, to the marked depression of our domestic trade caused both directly and indirectly by the present war, although the actual loss of our export lumber trade has been a secondary factor as compared to the reduction of the home demand.

Lumber is a commodity which is a necessity to civilized man, but unlike foodstuffs and articles of clothing its purchase can be delayed temporarily without serious consequences. During periods of financial depression from any cause whatever, we find that the purchase of lumber in large quantities is early discontinued and is resumed only after conditions have again begun to assume a normal state.

More than ninety per cent of our total lumber production is consumed by the domestic market and in order that the lumber trade may be brisk it is essential that our banking resources shall be abundant, since this means minimum interest rates and ready loans, both of which foster railroad development and building construction, two

factors of great importance in the lumber market.

Previous to 1906 the lumbermen enjoyed prosperity, due to the rapid development of domestic trade in general. The demand for lumber was great and the f. o. b. mill price of all construction woods rapidly increased, culminating in 1907 in prices for yellow pine, for instance, which were in excess of those received at any period either before or since.

Stumpage also increased in value at a very rapid rate, and lumbermen were encouraged not only to make heavy investments in raw material before the price became too high but also to add greatly to the mill capacity of the country. Many new mills were constructed and existing plants were also enlarged to meet the insistent demands for construction lumber and railroad material. The panic of 1907 had a demoralizing effect on building construction and also curtailed the extension of the railroad mileage of the country. Lumbermen found themselves with a heavy investment and a mill capacity greatly in excess of the normal demands, and the price of lumber dropped from \$5 to \$7 per thousand feet at the mill, reaching such a low level that many found it difficult to prevent their business from going into bankruptcy.

Since that time there have been periods when lumber market conditions have shown a change for the better, but as a whole the level of prices has not been high enough to enable the average operator to earn a legitimate profit on his investment.

The railroads which in normal times are very large consumers of lumber, using several billion feet annually, have purchased only sufficient material to keep their plants in operation and, for

some time previous to the war, had failed to buy even enough lumber to keep their rolling stock in repair, accumulating "bad order" cars by the tens of thousands on sidings, awaiting an improvement in financial conditions in general and also the clearing up of investigations being made by the Government. Just previous to the outbreak of the war, however, there were signs of renewed activity on the part of the purchasing department of railroads, and lumbermen began to feel optimistic in regard to an increased trade with them. The liquidation of very large amounts of railroad securities held by European investors immediately checked buying on the part of the railroads, and the loss of this trade has been one of the depressing features in the lumber business.

Another factor which has a marked bearing on the present unsatisfactory state of the industry, especially in the South, is the inability of producers to market certain staple articles, such as cotton and naval stores, valued at hundreds of millions of dollars. The cotton crop of the present season, one of the largest grown for several years, comprises the chief money crop of the farmer. European countries, mainly the belligerent nations, normally take more than one-half of the crop, but the indications now are that they will purchase only a small percent of the usual quantity. Not only is it impossible to successfully market this crop in other countries, due to their lack of plants suitable for working up the product, but also it has not been possible to increase the consumption in this country. In fact, the demand in the United States for cotton goods has decreased since the outbreak of the war; hence, the purchases of the raw supply are visibly affected.

A satisfactory method of financing the crop has not yet been reached, and until this is done the purchasing power of the lumber consumer of the South will be extremely limited. The pool of banking interests which proposes to raise and administer a fund of 135 million dollars for loan on the security of cotton may be a partial solution of the

problem, yet this will scarcely counterbalance the shrinkage of income of cotton farmers, due to low prices, (6.3 cents per pound on November 1st, as compared to 13 cents on the same date last year), a shrinkage which the Bureau of Crop Estimates of the United States Department of Agriculture places at 435 million dollars. The effect is far reaching since the farmer receives credit from the country merchant for supplies and sometimes cash advances; the country merchant, in turn, receives credit from the jobber, and the jobber from the manufacturer. The entire credit system is thus crippled. The "buy-a-bale" movement which has been advocated by some as a solution of the disposal of the cotton crop is totally inadequate to meet the present stringency, since at best it would probably take care of only a small per cent of the surplus, and, furthermore, the holding of this cotton in warehouses for an indefinite period awaiting a satisfactory price merely jeopardizes the next year's crop. What is needed is a market for the product which will convert it from a raw into a manufactured state.

Cotton is the staple crop of a large part of the southern rural population, many of whom have always operated on the "one-crop" plan and are incapable of substituting other products for cotton because they do not know how to grow them. One feature which may have a marked bearing on the extent of the acreage planted next season is the inability of the planter to secure the usual amount of fertilizer required for his field. In the past, phosphate, an important element in the commercial fertilizers, has been secured chiefly from Germany, and the elimination of that source of supply will undoubtedly embarrass the fertilizer manufacturers in this country. With a low price for their cotton this year and a probable decreased acreage next year, the southern farmer will not be inclined to purchase commodities not absolutely essential to his existence, and he certainly will not buy lumber with which to make improvements.

The lumbermen of the South depend on marketing a large percent of their

low grade product either in the state in which it is produced or in neighboring states on a low freight rate, hence the elimination of the farmer as a consumer is of vital consequence.

Another strong element mitigating against the Southern lumbermen is the fact that the naval stores crop, valued at nearly thirty million dollars, has not been successfully marketed. The bulk of the naval stores products are sold in Europe, and the elimination of the greater part of the demand from this region has caused financial loss not only to operators but to thousands of employees who were discharged at an earlier date than has been the custom.

Competition from sawmills in British Columbia, and over-production in local mills, with the resulting unloading on the market of large quantities of lumber are among the chief factors which have wrought havoc with the lumber industry in the Northwest.

The removal of the tariff on forest products has been a severe blow to lumbermen on the Coast, since it has opened our western markets to Canada—an especially unfortunate circumstance at this particular time. The industrial depression prevailing for the past year in Canada has greatly reduced the local demand for lumber and shingles, and, in order to keep their mills running, Canadian lumbermen have made a strong effort to dispose of their products in the United States.

Some idea of the extent of our trade in Canadian lumber may be gained by an examination of our imports previous to and following the removal of the tariff. Canada, chiefly British Columbia, sold in this country, during the first six months of the present year, nearly 170 million shingles more than she sold to us during the entire year of 1913. This was an increase of 217 per cent. The lumber imports from western Canada are still more striking, those for the first six months of 1914 exceeding the total for the entire year of 1913 by 246 per cent.

The western lumber manufacturers, as a whole, are facing serious financial difficulties due to their heavy investments in stumpage and the rapidly

increasing carrying charges. Taxes and the cost of fire protection have increased yearly, and in order to prevent these charges and also interest on the investments from compounding and automatically doubling the cost of the raw product every nine or ten years, stumpage owners have increased their mill capacity to a point which now exceeds the present market requirements. The over supply of lumber has led to such keen competition, during the present business depression, that lumber prices f.o.b. mill are now so low that the best grades are selling for about \$22 per thousand board feet; an excellent quality of building lumber for about \$8 per thousand feet; and low grade lumber for \$3.50 per thousand feet. The average price per thousand feet, f.o.b. mill for all grades marketed has not averaged, during the present year, more than \$11, a drop of several dollars over the average mill value of two or three years ago.

The lumber-consuming population within a given radius of the western manufacturing centers is much less than for an equal radius in the other lumber-producing centers of the United States. The high freight rate into the most desirable consuming centers, namely, the great prairie region of the Middle West, combined with the very low price at which lumber is now sold, due to unrestrained competition, has practically made it impossible to conduct the business so as to yield even a small profit. It will take more than a revival of good business conditions to patch up the badly demoralized industry in this section, and some means must be found to increase the efficiency of the marketing methods and curb the ruinous competition which now threatens to sap the life of the industry.

The money stringency which has prevailed in this country during the last three months has been reflected most markedly in the amount of building which has been done, reports for the month of September showing a decrease of from 25 to 32 per cent over the previous month. This is due to the decreased banking resources of the

country and to the resulting increased interest rate.

The rural sections of the farming regions of the Middle West have not felt the money stringency to as great a degree as many other sections since their farm products are in great demand and prices for farm products are high. The trade, therefore, in that section does not show the fluctuation that is evident in large centers, especially in the East.

The loss of foreign trade in lumber has not been so vital to the lumber industry, except in an indirect way, since recent estimates show that only approximately eight per cent of the lumber cut of 1913 was marketed abroad. European trade in lumber almost ceased during the early period of the war, due both to the cessation of purchases abroad and also to the withdrawal of vast numbers of vessels from the cargo carrying trade through fear of capture by the navies of hostile nations. This trade has been resumed only to a limited extent, and it is doubtful if the amount forwarded to the European markets for some time to come will be of sufficient importance to have any appreciable effect on the industry in this country.

Lumber trade with South America was reported unsatisfactory for a year previous to the war, due to unfavorable crop conditions especially in Argentina, the largest South American consumer of our lumber, but gave promise of marked improvement about the time that the war broke out, when it again became depressed due to the disorganization of the credit systems of the South American countries.

We always have supplied a large part of the lumber imported by South American countries and will still continue to do so, but at the present time their buying power has been greatly curtailed by their inability to make settlement for goods purchased. Our imports of all commodities from South America during the fiscal year 1913-14 were valued at approximately 223 million dollars, while our exports of all kinds to that continent during the same period were approximately 125

million dollars. The balance of the imports of South America amounting to nearly 900 millions came largely from Europe. We have had no direct banking facilities with our sister republics and because they owe heavily in London the trade accounts between the two American continents have been normally adjusted at that place. Under existing conditions this is impracticable. We are ready and willing to purchase and pay for South American products, but lumbermen, along with other merchants, are reluctant to sell their commodities in countries which have declared moratoria, as have several of those in South America.

The future holds promise for better things since American banking firms are now permitted to establish branches in foreign countries and steps have already been taken by at least one banking firm to do this. However, it will be some time before the situation will be relieved to the extent that the trade in lumber and other commodities will again resume its normal course.

Indirectly the loss of foreign trade has been a hard blow to the lumber industry. There are many sawmills along the South Atlantic, the Gulf Coast and the Pacific Coast, which have been engaged to a large extent in supplying lumber to foreign countries, and with this field cut off they have naturally turned to our domestic markets and have invaded the field previously occupied almost exclusively by interior mills.

The interior market, already in an unsatisfactory condition, has been unable to assimilate this increased output at a price which would yield a reasonable profit to the producer, and, as a consequence, many have been liquidating and still continue to liquidate on their investment in stumpage at a loss.

It may be asked why production does not follow the law of demand and adjust itself to market conditions. There are many reasons why the industry responds rather sluggishly to the general trade barometer. The lumber manufacturer has a large investment in plant and often in raw material, on which he must pay interest or else

turn over his property to his creditors. He, therefore, attempts to secure ready money to continue his business by marketing his product at a price below its actual worth. He can rarely secure loans from banks when markets are depressed, because banks then refuse to loan in sufficient amounts on satisfactory terms. Overhead charges are an important item in the cost of placing lumber on the market, and a curtailment of cut or a total cessation of operations seldom reduces this to a marked degree, hence a large deficit rapidly accumulates and may ultimately mean bankruptcy.

The manufacturer in some sections of the country, such as the Northeast and the Lake States, often transports his logs to the mill by water, cutting the timber during the fall and winter previous to the sawing season—the warmer months of the year. He must, therefore, anticipate market conditions months in advance, and having invested his money in logging and in placing the timber in the stream he feels forced to manufacture the logs into lumber, both to save them from deterioration and to get them into marketable form.

Even with railroad operations it is costly to close down since a large amount of valuable equipment becomes idle and must be cared for at considerable expense, even though it is not earning anything for the owner.

A large labor organization is essential for the operation of a big lumber plant, and an efficient force may be the result of several years' effort on the part of the operator. A cessation of operations means the dissipation of the crew, who are either forced to remain idle or else seek employment elsewhere. It is usually the case that a total or partial cessation of operations is general throughout a section and all industries are more or less affected, hence the labor supply exceeds the demand and there is but little opportunity for even a good workman to earn a living. Many lumber manufacturing plants are located more or less remote from the large centers of population, and frequently the lumber manufacturing plant is the only industry of the community

and the sole means of earning a livelihood for the citizens. Under these conditions an added hardship is laid upon the woods or mill worker who finds himself without employment. It is greatly to the credit of many lumbermen that today they are operating their plants at least on partial time, chiefly to provide employment for their workmen who have been faithful to them, although it means a financial loss to do so.

Another reason why the large lumber manufacturer who caters especially to the domestic trade cannot cease to produce lumber is that he has built up his trade and customers demand some lumber even during periods of financial depression. If the manufacturer ceases to produce lumber, buyers seek out other sources to supply their needs and the seller may lose in a short time many desirable customers. A resumption of business on the part of the producers means the development anew of trade connections, since old customers who have been lost seldom return in normal times.

Extremely low mill prices, such as prevail today, mean greater waste both in the forest and in the mill, since the poorer grade of lumber cannot be sold at a price that will even approximate the cost of manufacturing and selling it. It is of direct interest, therefore, to each and every citizen of the United States that some steps should be taken which will make it possible to market, without loss, the poorer grades. Poor grades can be marketed only when the supply of all grades is not in excess of the demands of the country. In times of business depression this means a curtailment of cut on the part of the larger operators, as well as scientific marketing of the product, both of which are largely dependent on close cooperation among manufacturers. This does not exist today because the members of the lumber industry and lumber trade associations of the country have been harassed during recent years both by courts and by the Federal Government, with the result that such cooperation as formerly existed has largely been destroyed and both the industry and the public have

suffered by the demoralization which is now present in the lumber business, caused first by investigations and later aggravated by the business depression caused by the war.

The "bogey," in the shape of an alleged lumber trust which has been flashed before us constantly in the newspapers during the last few years, is a figment of the sensationalist, since there has never been an organization of lumbermen in the United States that has ever dominated the entire lumber trade and controlled output and prices. From the standpoint of the economical use of our forest resources, it has been

our misfortune that a "governor" of some character has not been in power.

The lumber industry in its present trouble deserves the good will and co-operation of both governmental and private agencies, and it is to be hoped that this will be granted it in fuller measure than has been meted out to it in the past. The lumber industry is essential to our well being and prosperity, and every encouragement should be given for its development on a basis which will give assurance of the fullest and most economical utilization of the forest resources.

PENNSYLVANIA FORESTRY PROGRESS

A letter from Robert S. Conklin, Commissioner of Forestry of Pennsylvania, says:

"I call your attention to the activities of the Pocono Forest Fire Protective Association in the north eastern part of Pennsylvania. They have increased in membership almost two hundred per cent. in the last year and instead of operating simply in a few townships on the Pocono mountains, are now exerting their influence over the entire county of Monroe and may possibly extend into Pike and Wayne counties. They were very active in helping pass some improvements to the forest fire laws in the last Legislature, and expect to be of considerable service in the coming session of the general Assembly. At their request a District Forester was appointed for Monroe county and through his activities the fire wardens have been thoroughly organized and a patrol system has been worked out. As soon as the association gets a little better financial support, through cooper-

ation with the Department of Forestry, the district forester will institute a complete system of patrols for the entire county. In October practically all the papers of the county issued a conservation number. The matter of forest protection is becoming a real live subject in the neighborhood, and in October Dr. J. T. Rothrock delivered a lecture in Stroudsburg on the subject "Forests in the Life of the Nation."

A year ago the Pennsylvania Forestry Department published some large fire posters and some small forest fire stickers. Both of these features have met with such great success throughout the State that the department has had to have the third printing of fire posters and is now awaiting the second order of fire stickers. This fall the merchants throughout the forest regions of the State placed the fire sticker upon each box of cartridges which goes out from the stores. In this way it is certainly possible to reach a great number of hunters.

Speed in Fire Fighting

What is supposed to be record speed in getting men to a forest fire is reported from Oregon, where on one of the National Forests, a ranger went to town, hired ten men, and got this force to the fire twelve miles away within 48 minutes after he was notified by telephone.



A SUNDAY CROWD ON TAMALPAIS.

ON SUNDAYS AND HOLIDAYS THOUSANDS OF PEOPLE INVADE THE TAMALPAIS REGION, SPENDING THE DAY ON THE DELIGHTFUL MOUNTAIN SIDE.

TACKLING TAMALPAIS

By FREDERICK E. OLMSTED

Forester for the Tamalpais Fire Association

FROM the earliest days fires have always raged on Mt. Tamalpais, California, during the dry seasons. Every summer has brought numerous burns, some large, some small; and once every dozen years or so great conflagrations have swept the hills, licking the cover clean and causing more or less consternation in the region 'round about.

The fire of 1913 was probably no worse than some of the periodical con-

flagrations of the past. It was taken more seriously, however, because more lives were threatened than ever before, because the property narrowly escaping destruction totaled several millions of dollars, and because public interest in the Tamalpais region as a vast mountain park has recently become intense. The fire of last year burned for five days, covered 2,000 acres, nearly wiped out the towns of Mill Valley, Corte Madera and Larkspur and was fought by some



A FIRE TRAIL.

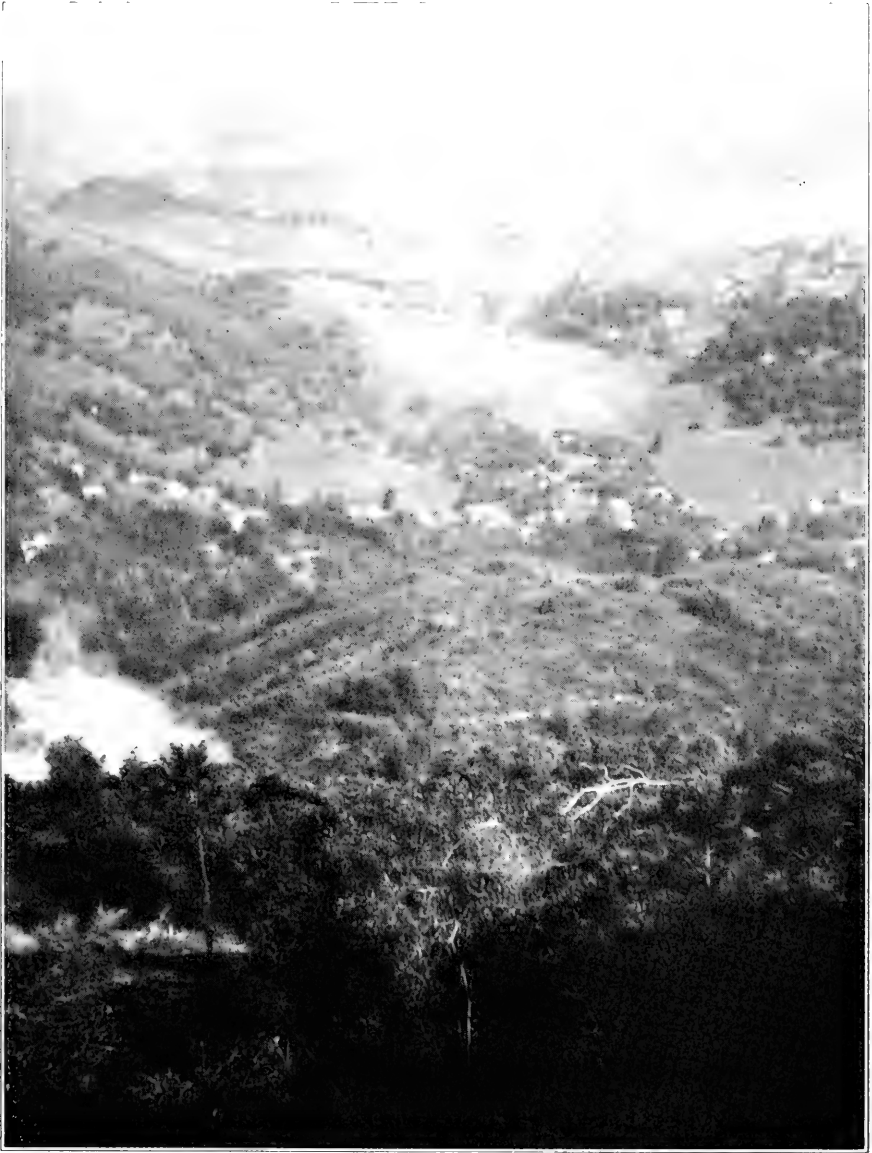
THESE TRAILS, CLEARED THROUGH THE HEAVY BRUSH COVER OF THE RIDGES ON MT. TAMALPAIS, PERMIT QUICK ACCESS TO ANY FIRES.

4,000 men at an expense to the community, state and nation of more than \$30,000. Not to be overlooked, moreover, were the indirect losses in property values which followed as a result of the scare. The fire was finally checked with the assistance of troopers from the United States Army acting under advice from officers of the Federal Forest Service and old-time fire fighters of the locality.

To avoid a repetition of such a calamity the Tamalpais Fire Association is carrying out a scheme of systematic fire prevention which bids fair to become permanently established.

The jumbled hills of Marin County end abruptly at the Golden Gate on the

south, are pounded by the Pacific on the west, slope gradually to San Pablo Bay on the east and stretch northwards to join the great redwood covered mountains of the Coast Range in Mendocino and Humboldt. Mt. Tamalpais is a sort of jumping-off place at the extreme southern end of the hills and rises sharply from San Francisco Bay to an elevation of 2,600 feet. A large part of the land is covered with a dense and difficult growth of high and low chaparral—all the many species common to the Coast Range. There are scattering patches of timber in the canyons, largely redwood and douglas fir, while on the slopes of Lagunitas Canyon and in Muir Woods National Monument are ex-



MT. TAMALPAIS.

THE TOWNS SEEN IN THE DISTANCE AT THE FOOT OF THE HILLS ARE IN REAL DANGER OF DESTRUCTION FROM THE BRUSH FIRES. NOTE THE SMOKE OF A FIRE ON THE LEFT.

tensive and heavy stands of these trees. Hardwood forests of oak, laurel and madrone have smothered out the brush cover here and there. The whole effect is one of exquisite softness; combined with delightful views of ocean, bay and distant hills the restful impression conveyed by this unique and remarkably

beautiful little region is beyond description.

All of which goes to say that the top of Marin County is a most wonderful natural park, a great recreation ground, and should be treated as such. It is now used as a play-ground by thousand of people from San Francisco and the



BRUSH BURNING ON TAMALPAIS.

THIS BRUSH IS CUT OFF LEVEL WITH THE GROUND, PILED AND CAREFULLY BURNED. IT IS SOAKED WITH KEROSENE ON WET DAYS.

near-by towns and in years to come sit use for this purpose will be largely increased. It follows, as a matter of course, that the highly inflammable growth must be protected against fire and that this protection must be extremely thorough. Fire must be prevented from starting, rather than fought after it has spread.

All the land is in private ownership. This public park (which it is, in effect) is privately owned and is enjoyed by the people through the generosity of the owners. Thus, in many ways, the situation is complicated.

The plan calls for a construction period of three years, during which time

forty miles of fire trails, numerous foot trails, a telephone system and several lookout stations are to be constructed. Within this period, also, the district to be protected must be thoroughly supplied with fire fighting tools and other necessary equipment. Last winter some thirteen miles of fire trails were completed. These run, for the most part, either along the tops of the ridges or about a hundred feet below the crests on the leeward sides. In the latter cases the trails are "one way" fire trails, designed for the protection of towns or property threatened chiefly by fires which are almost certain to come from one direction only. As these

trails are slightly below the tops of the ridges they are out of the prevailing winds, thus affording safe opportunity for backfiring and, in many instances, stopping the slow down-crawling fire without the assistance of back-fires. The trails vary in width from eight to thirty feet, depending upon the nature of the locality, the height of the brush, and the fire hazard. The brush is cut off level with the ground, piled and burned. For the present, at least, grubbing out the roots is too expensive and the new growth will have to be cut back every two years. The average cost has been \$114 a mile.

Fire fighting tools, brush hooks, shovels and axes, for a total of 600 men, are distributed in boxes located at convenient points along the trails and roads. Each box, also, contains lanterns and five gallon water bags.

Mounted patrolmen are employed during the dry season, from the middle of May to the first of November. These patrolmen are supported by numerous volunteer fire fighting forces with headquarters at the little towns around the mountains. Each of these forces is thoroughly organized under definite and well understood leadership. There is in each instance a captain of fire fighters with a couple of assistants and squad leaders, and the commissary and other routine business of the organization is tended to by an agent who, in case of fire, sticks to his post in town and carries out instructions from the field. The leaders and agents, as well as the patrolmen, are deputy state fire wardens with power of arrest and authority to compel men to fight fire.

As before mentioned, the *prevention* of fire is the most important and by far the most difficult job to be tackled by the association. Although the causes of fire are similar to those on the National Forests—matches, tobacco and camp fires—it should be remembered that there are a hundred people roaming about the Tamalpais country for every one on the National Forests. On Sundays and holidays it is not at all uncommon for 5,000 people to tramp over and camp upon a district not exceeding 10,000 acres, and as a part of

this throng is made up of the careless and irresponsible element from the city the fire risk on such days is extremely high. To fight this condition a great deal of publicity has been given to the work, stress being laid upon how easy it is to prevent fires from starting and how difficult and costly to stop them after they have spread beyond the control of a few men. Thousands of fire warnings have been posted along the trails and at camp sites and these seem to have served a useful purpose. Here is one sample:

*Was your match COLD when you
threw it away?*

LOOK BACK!

Here is another warning which proved effective.

DANGER!

PREVENT FIRES

1. *Break your match in two before you throw it away.*
2. *Stamp out lighted tobacco before you leave it.*

The camp fire nuisance has been well controlled through a system of permits. Fires are allowed at certain designated places only where the ground has been made as nearly fool-proof as possible, and even at these places camp fire permits are required. The public has not shown the slightest objection to such regulations. It is considered better policy to control the building of camp fires than to endeavor to prohibit them. General prohibition is both easily proclaimed and quite impossible to enforce. Regulation is thoroughly effective. Moreover, there is no good reason why camp fires should not be permitted at certain locations and under suitable restrictions. Such a privilege adds greatly to the enjoyment of the park lands.

The most interesting part of the associations' work is the financial or-



ADVERTISING FIRE PROTECTION WORK.

A LARGE BULLETIN BOARD IS USED. ON THIS ARE TACKED MAPS OF THE TAMALPAIS REGION, PHOTOGRAPHS OF IT AND A VARIETY OF SAMPLE FIRE WARNINGS.

ganization. The tracts of land in private ownership vary in size from a few acres to large estates of 12,000 acres and more. For the three year construction period all the landowners are contributing on the basis of 10c per acre per year. The towns, which are vitally concerned from the standpoint of self-preservation, are subscribing largely

according to their assessed valuations and the danger to which they are exposed. Lastly the public, enjoying the use of private lands as a public park, shares in the expense of protection through membership dues in the association. Eventually, if the organization is to be a permanent one, Marin County must cooperate financially by means of

a general tax levy, and in case the county does share the expense it is not at all unlikely that the State of California will become a partner in the work. A precedent for state cooperation has already been established in the admirable fire prevention organization of Los Angeles County. Moreover, the systematic protection of Tamalpais is much more than a local matter; it concerns both the state and the nation.

The methods of fire prevention were

entirely successful during the dry season of 1914. Only eight fires occurred, and these were all in the grass country of the foot-hills, burning over but a few acres in each case. They were promptly tackled by the organized fire fighting forces and extinguished with practically no losses. Of course some fires must be expected in the future; but they should be limited to comparatively small areas and should be squelched without a rumpus.

FIRE CONDITIONS IN CALIFORNIA

By ALEXANDER W. DODGE, *Deputy State Forester*

FIRE conditions in California during the past summer have not presented a problem as difficult as the one dealt with in 1913. The fire season of 1913 was exceptionally severe; a great many large fires occasioned an enormous loss, namely \$511,077.00, an amount far in excess of the financial loss sustained during 1914. The total money loss, due to forest fires in California in 1914 is \$179,025.75. Fires have been well reported on the National Forests and the United States Forest Service has devoted special attention to the prevention and suppression of forest fires this year. However, since a great many fires without the National Forests have occurred and have not been reported, owing to the inefficient system of voluntary fire-wardens, it is impossible to secure an accurate total. The figures of loss, then, during 1914, are necessarily incomplete for areas outside the National Forests.

During the year there have been comparatively few heavy winds, such as marked the summer months of 1913. Although the vegetation became dry, the atmosphere has been exceptionally cool and moist during the greater part of the summer. This, naturally, had its fortunate effect upon the number and seriousness of forest fires. The Federal Forest Service has given the fire situation added consideration by maintaining extra fire patrols and forest guards. The State Forester, so far as his limita-

tions would permit, has made every effort to reduce the fire damage by making forest fire prevention popular. There has been rigid prosecution of offenders against the State and Federal forest laws. Throughout the summer it has been proved that the damage actually done has been small in comparison to the damage averted. The Sisson fire was controlled at an expense to the Forest Service of about \$25,000.00. However, a great many thousand dollars worth of property would undoubtedly have been destroyed had the fire not been fought. Our inadequate state forest law handicaps the State Forester in handling just such fires.

There were 1,971 forest fires reported in 1913 within the State, while the incomplete report for 1914 shows 1,330. Forest fires, since January, 1913, have caused the loss of four human lives in California.

Forest fire conditions, outside the National Forests, are going to remain approximately the same, modified slightly each year by favorable or unfavorable weather conditions, until the State establishes and maintains an adequate protective policy. And this can be done only through proper legislation. The attempt to secure such legislation is constantly being made by promoters of an effective state forest law. In the past these efforts have been defeated by opposition based largely upon selfishness.



THE CANADIAN DEPARTMENT

By ELLWOOD WILSON

The Hon. O. T. Daniels, Attorney General of the Province of Nova Scotia, is investigating the practicability of reforestation by planting in his Province and also the methods of fire protection in use in various sections with a view to improving local conditions. Since the survey made of the Forest Resources of Nova Scotia by Dr. Fernow in 1911 there has been an awakening of public sentiment to the necessity of conservation. The Maritime Provinces have been a little behind the others in this work and Nova Scotia is to be congratulated on making a start.

Mr. G. C. Piché, Chief Forester of Quebec, with his Assistant, Mr. A. Bedard, have just issued as "Bulletin No. 2" a pamphlet entitled "Etude sur les Forêts de la Province de Québec." This is largely a compilation from the records and shows: the forested areas of the Province, the forested areas of the whole of Canada, the value of forest products by kinds for Canada, the areas privately owned and under license in Quebec, Quebec's Forest Reserves, list of names of trees occurring in Quebec, in Latin, French and English, the total quantities of wood cut since 1871 and the revenue derived therefrom. There is also a table showing the number and species of all the trees on forty-five acres of land.

Mr. Alan Parlow, of the Canadian Society of Forest Engineers, has gone to England with the first Canadian Contingent.

Owing to the urgent need of pit props, telephone and telegraph poles in England, the Quebec Government has removed the restriction which forbids the export of unmanufactured wood, insofar as it applies to these articles.

The Quebec Government held a sale of timber lands to be operated under license on October 20th. 1,036 square miles were sold, mostly in small tracts, for an average price of \$238.00 per square mile.

The Forestry Department of the University of New Brunswick has opened the scholastic year under favorable auspices, with about thirty-two students. Under Professor R. B. Miller, this Department has done excellent work, the graduates showing up well. Three are District Foresters in British Columbia.

Professor W. N. Miller, formerly Inspector of Forest Reserves in the Dominion Forestry Service, has been appointed to succeed Mr. A. H. D. Ross as lecturer on Mensuration, Utilization and Protection.

Mr. J. E. Rothery, of the firm of Vitale & Rothery of New York, has just finished the field work of a survey and reconnaissance for the James McLaren Co. of Ottawa, covering about 2000 square miles.

The Forestry Work of the Canadian Pacific Railway, with Eastern Headquarters in Montreal, has been transferred from The Department of Natural Resources to that of Operating. This work is in charge of Mr. B. M. Winegar, who studied at the University of Michigan.

Owing to the war it is probable that the Forestry Congress which was to have been called by the Premier Sir Robert L. Borden, in Ottawa in January, 1915, will be postponed.

All the lumber Companies in Eastern Canada are curtailing their cut somewhat on account of the war.

In common with the Pacific Western States, British Columbia experienced a very dry and bad fire season, the worst in many years.

Figures so far available are as follows: Total area burned, over 300,000 acres; of this over 200,000 was old burn or slash. Nearly 50,000 acres was valuable second growth. Over 15,000 was merchantable timber. Over 60,000,000 F. B. M. merchantable timber was killed, of which over $\frac{1}{3}$ is salvageable. Nearly 400 miles of fire lines were built in fighting the different fires. The total number of fires was about 1500, of which over 400 cost money to extinguish. The total cost of fire fighting was approximately \$100,000.

In one big fire on the tributary of the Barriere River a whole train was chartered to carry fire fighters from Kamloops, the nearest town, to the scene of the fire.

The figures above show that the expense of fire fighting has been great and that a large area has been burned over. The amount of merchantable timber destroyed is, however, comparatively small, the chief damage being

young growth. A good deal of the area burned over was old logging slash and in many cases this is actually a benefit, since it removes a fire hazard and clears the ground for reproduction.

The Northern limit of white pine in Interior British Columbia is at the headwaters of Sand Creek, a tributary of the Fraser River, near Tete Jaune Cache. The head of Sand Creek is near Albreda Summit, in the pass through which the C. N. P. Railway goes on its way from the Fraser River to the North Thompson River.

A Forest Branch telephone, 65 miles in length, connecting a number of islands which are situated between Vancouver Island and the Mainland, has just been completed, and is working satisfactorily. It crosses three different channels (one of them being over 1000 feet in depth, and all of them with swift tide current) by submarine cable, totalling in length 16,000 feet. These islands are central, in the zone of greatest logging activity on the British Columbian Coast. Besides rendering valuable service in fire protection and forest administration, this line gives connection through a Dominion Government telegraph line with Vancouver, the financial and supply centre, to a large number of logging operators.

Another telephone line, 120 miles long, has just been completed up the Columbia River, from Revelstoke North to the Big Bend of the Columbia, near the mouth, of Canoe River, a tributary. This portion of the Columbia lies in the Interior Wet Belt, where the timber, Douglas fir, cedar, hemlock, white pine, spruce and balsam, is second only to the Coast timber in size, quality, growth and stand per acre. A large amount of this timber is held privately under lease or license, and the balance is still the property of the Crown. This Interior Wet Belt type of timber extends Northerly up the Canoe River. The Forest Branch has already built a trail in the upper portion of the Canoe Valley, and it is planned eventually to complete the trail down to the Columbia, and to extend the telephone line up the Canoe.

For quality, quantity and accessibility of pulp timber and for available water powers, British Columbia probably stands first in the world. All along the Coast are vast quantities of hemlock, spruce and balsam, easily transportable to the many fine water powers to be found near saltwater in the numerous inlets. In the Northern Interior, in the upper water-sheds of tributaries of the Northern part of the Fraser River, and the other Northern Rivers, are to be found vast areas of spruce and balsam forests, while the mountain rivers afford numerous good sites for water powers.

Each year the Forest Branch is making fuller use of the Dominion Government telegraph stations, wireless and otherwise, both for administrative and fire protection work. Through cooperation with the Dominion Meteorological Service at Victoria, telegraphic weather reports have been received each day during the fire season from various stations throughout the Province. These reports, especially those from the Northern stations, have assisted in the forecasting of weather and enabled the Forest Officers to be notified in advance of dangerous dry winds. The reports were also transmitted to the U. S. Meteorological Service at Portland, and were utilized by the Western Forestry and Conservation Association in a similar manner.

On the Yukon telegraph trail, away up North of Hazelton in the Groundhog country, the Forest Branch has seeded certain burned areas of Crown land to timothy and white clover, in order to furnish food for the horses of the Forest Guards.

Pulp sales have recently been advertised under the authority given by the

Forest Act offering somewhat over 200 million feet of pulp timber for sale at upset prices ranging from 10 cents to 25 cents per thousand feet Board Measure.

This timber is comprised mainly of Western Hemlock, Balsam Fir and Sitka Spruce with an admixture of Douglas Fir and Cedar. The time allowed for the removal of the timber is 30 years and for the first time in the history of Canada provision has been made for the readjustment of stumpage prices every five years for the last 20 years of the term. This readjustment is based on the recent Royalty Act, which provides for a percentage increase on the increased cost of manufacture of lumber over \$18.00, the proportion increasing 25% in 1920 to 40% in 1945.

A cargo of 160,000 creosoted Douglas Fir Railway Ties was shipped last week by the Dominion Creosoting Company of Vancouver to the Bengal and North Western Railway Company at Calcutta.

The Forest Branch was instrumental in obtaining this trial order for British Columbia and acted as inspectors for the Railway Company to see that their specifications were properly fulfilled. These specifications called for the best quality of Douglas Fir to be impregnated with 12 pounds of creosote per cubic foot.

The Forest Branch is now negotiating with importers in the United Kingdom with a view to supplying quantities of mine props, which before the outbreak of European hostilities were obtained from the Baltic. Great Britain is a tremendous user of pit props and these can be produced in almost unlimited quantities at a very low figure in British Columbia, and it has been shown repeatedly that Douglas Fir is one of the best pit prop woods.

Germans Protecting Trees

It is said that the German invaders of Belgium, whatever else they may have destroyed, have been careful not to injure park trees. The cavalymen, so a report goes, are forbidden to tie their horses to trees for fear that the animals will gnaw the bark. Germany was the first nation to apply forestry on a large scale, some of the crown forests having been under scientific management for over a hundred years.

ANNUAL CONSUMPTION OF WOOD

STATISTICS have been compiled by the Forest Service which show for the first time precisely how the lumber produced in the country is utilized. About 45 billion feet of lumber of all kinds is the annual production in the United States; of this nearly 25 billion feet, board measure, are further manufactured, the other portion remaining for rough construction lumber and for similar purposes. This is exclusive of material which reaches its final use in the form of fuel, railroad ties, posts, poles, pulpwood, cooperage, wood distillates, and the barks and extracts demanded by the tanning industry.

The work of collecting and compiling the figures extended over a considerable period and was carried out State by State; but as one full year was made the basis of statistics in each State, the total is a fair average of the use of lumber in further manufacture in the whole country. Between 50 and 60 per cent of the lumber produced is subject to further manufacture. In preparing the figures in this way, however, it should be remembered that considerable material reaches shops and factories in the form of logs, bolts, and billets without having passed through sawmills, and while this material is included in these statistics this fact should be remembered in comparing statistics with those of lumber production.

Nearly or quite 100 different woods are used in this country under their own names, while an unknown number find their way to shops and factories without being identified or separately listed, except under general names. In quantity the softwoods, the needle-leaf or coniferous trees, are most important, but there is a greater number of species among the hardwoods, or broadleaf trees. Yellow pine comes first with more than 8 billion feet, followed by white pine with 3 billion, and Douglas fir with a little more than 2 billion. It should be understood, however, that the term "yellow pine" includes several species the three most important of which are longleaf, shortleaf and lob-

lolly. Oak, including all species, has nearly 2 billion feet, and is the most important hardwood. Maple comes next.

Dogwood comes about halfway down the list with more than 7 million board feet, and of those species mentioned Turkish boxwood comes last, with less than 30 thousand feet, followed by many others too insignificant to list but making a total of all kinds of more than a million feet. Of the native species, laurel, holly and yucca fall very near the foot of the list in relative quantities used.

Fifty-five principal industries use wood as raw material. Their relative importance is hard to indicate, because quantity alone is not in all cases a criterion of value of an industry to the community in which it is situated, nor to the country as a whole.

More than one-half of the total consumption consists of planing mill products, the largest items of which are flooring, siding, ceiling, and finishing. The next industry, in point of quantity of wood used, is the manufacture of boxes and crates. Nearly four times as much wood is demanded by makers of boxes and crates, as by the builders of steam and electric cars, which come next, and five fold the amount that goes into furniture, which in turn leads vehicle manufacture. Vehicles demand surprisingly large supplies of wood, and much of it must be of a high class in order to meet requirements for frames, gears, and bodies.

Chairs, listed separately from furniture, come after novelties and supplies for dairymen, poultry keepers, and apiarists and just before handles and musical instruments. About midway down the list come pumps and wood pipes. Among the products important enough to list separately are canes and umbrella sticks, brooms, firearms, artificial limbs, and tobacco pipes.

The apportionment of wood among the various industries grades from planing mill products, which take most, down to aeroplanes and dry kilns, at the bottom of the list.



EDITORIAL

THE belief of the Germans in the necessity for conservation of the forests is evidently inherited by Germans and their descendants in this country, for we find, in an address by Leo Stern, an officer of the National German American Alliance, delivered at Milwaukee in November, this paragraph:—

“At every one of its meetings the National German American Alliance has heard the subject of forestry discussed by experts, and it has year after year adopted strong resolutions by unanimous vote in support of forest preservation and reforestation. On this question the Wisconsin alliance, which represents 50,000 citizens of the State, stands shoulder to shoulder with the national body.”

It is gratifying to know that this statement was made before the members of the Wisconsin joint legislative committee on forestry, and it should give the members of this committee food for

thought. Even if some of them, as is doubtless true, have no knowledge of the forest needs of the state, even if they have an ingrained dislike for anything that savors of conservation, they cannot overlook the fact that some 50,000 voters of the state feel regarding forest conservation as Mr. Stern says they do. We opine that there is no member of the Wisconsin legislature so heedless of his own political future as to fail to give some consideration to the wishes of 50,000 voters. There are also many other thousands of voters of Wisconsin who are not members of the National German American Alliance and who feel just as strongly regarding the preservation of the state forests as do the aforementioned 50,000.

What great good might be done the cause if many other organizations would also, year after year, pass strong resolutions in support of forest preservation and reforestation.

TEXAS has joined the several other states which are demanding from their Legislatures, which meet early in the year, the passage of a law creating a state department of forestry and the employment of a non-political state forester who shall be supplied with a sufficient appropriation to do satisfactory work. It is significant that the demand for such a forestry law came first from the lumbermen of the state. This is an evidence of the value of

publicity in the cause of forest conservation. Not so many years ago it was practically impossible to find any number of lumbermen favoring the conservation of the forests. Now a large percentage of them realize the absolute necessity of it, and many of them are among the most enthusiastic members of the American Forestry Association and various other organizations devoted to securing the perpetuation of the forests.

In Texas the lumbermen have already passed resolutions calling upon the members of the next Legislature to give earnest consideration to a forestry bill and now they are aiding in the organization of a State Forestry Association, the special object of which is to work for state conservation. In Texas the productive timber area amounts to about 17,000,000 acres, or more than three times the total area of Massachusetts. In recent years timber has been so lavishly cut in the state that the extinction of the lumber industry was in sight, and none realized it better than some of the leading lumbermen there. Another danger has already been experienced, the increase in the number and the destructiveness of river floods owing to the excessive cutting of trees in the river bottom lands and on the watersheds.

A state forestry law would provide for replanting and the encouragement of reforestation on such areas and this would in some years largely prevent

the damage that is now likely to be done each year. The proposed State Board of Forestry will, if created, formulate plans for carrying on practical forestry throughout the state and will exercise supervision of all matters of forest policy and protection.

An important feature of the work would be the protection afforded against forest fires by systemized fire patrol work, and the education of the public in ways and means to guard against such fires. The Federal Government would also cooperate with the state in this fire protective work. At present only three Southern states, Kentucky, Maryland and West Virginia are receiving such cooperation.

An effort will be made to secure an appropriation of \$20,000 to carry on this state forestry work. It is expected that a state forest reserve will be established in east Texas and one in west Texas and perhaps a national forest reserve in central Texas.

CALHOUN COUNTY, Michigan, is to follow the example of other counties in various states and attempt roadside planting of trees for the dual purpose of beautifying the roads and also of protecting them, for such trees not only serve as windshields and minimize the effect of winds blowing off the loose surface but they also add to the life of roads by aiding to retain in them necessary moisture. Calhoun County, however, has gone a step farther than most others in deciding to plant fruit trees instead of shade trees, with the Utopian notion that when the trees bear fruit the fruit may be sold and the money thus derived be used in the up keep of

the road. The projectors of this plan say that it is eminently practical and we hope that it will prove so. There are 112 miles of road in the county and if the trees planted along these bear fruit the small boys of the county will certainly be in hearty favor of the idea. Whether enough fruit to sell is obtained from these trees however is not of prime importance, the fact remains that trees are to be planted and the road and the county residents both benefited. Perhaps the day will come when most of the roads throughout the country will be bordered by trees, and everybody will wonder why in the name of all that is sensible, it was not always so.

A PROGRESSIVE citizen of Rockford, Illinois, G. J. Boehland, is good enough to advise the American Forestry Association of the success of a plan he had for inspiring in the school children of Winnebago County, in which Rockford is situated, a love of trees. Last spring he presented

to each pupil in the city, county, and parochial schools a young tree to be planted wherever the children liked, and to each school a large tree to be planted in its playground. A total of 11,800 trees were thus given away by Mr. Boehland and now, six months after, he takes pride in reporting that a

large percentage of the trees are growing and are hardy while many of the children have become so interested that they have acquired more or less knowledge of trees, how to care for them, and their uses. It is now proposed to continue this good work next spring.

What would it not mean if one citizen in each city and town in the United States showed a similar interest in encouraging, in such an essentially practical way, a love of trees in the growing generation.

ABLE men the country over are aptly saying that one effect of the war upon the citizens of the United States will be to add to their belief in conservation. It has already developed, close observers of the general situation say, a noticeable trend toward appreciation of the value of conserving our resources, financial, and otherwise; to restricting extravagance in the use of commodities and in the pursuit of pleasures and frivolities; and to inspiring a desire for thrift. All of this will be beneficial. It will aid in a further realization of how foolishly and how recklessly various natural re-

sources have been wasted in years past; and will add strength to the movement to take proper care of what is left.

When the war ends greater exportation of timber than ever before is expected. There will therefore be greater cutting of our forests. This again calls attention to the need of closer utilization in logging and manufacturing, to the need of still better forest fire protection; to the encouragement of forest planting where practicable, and to every measure calculated to aid in the production of timber as a crop.

A Forester's Directory

The American Forestry Association wishes to compile and to keep up to date, a directory of foresters, in the United States, its possessions, Canada and Mexico.

This will be of considerable benefit to the members of the profession, as the Association is frequently asked for information concerning the whereabouts of foresters, and is also often asked to recommend foresters for various positions.

The American Forestry Association therefore requests each forester, whether he is a member of the Association or not, to send his full name, address, name of school or schools of which he is a graduate, and the feature, if any particular one, of his profession, in which he specializes.

This directory will be kept up to date from year to year, and will be available for any inquirers at any time.

Uses of Apple Wood

Apple wood, used almost exclusively for saw handles, also furnishes the material for many so-called brier-wood pipes and particularly for the large wooden type used in printing signs and posters.

Boxwood Expensive

One of the most expensive woods used regularly in an established industry in the United States is boxwood, the favorite material for wood engraving. It has been quoted at four cents a cubic inch, and about \$1,300 by the thousand board feet.



FOREST NOTES

Bristow Adams, who for some years has done excellent work in the Department of Information of the Forest Service, has resigned to take charge of a new department at Cornell University. He leaves the Forest Service on December 10, much to the regret of his associates there and of the many others who have so greatly appreciated his services whenever information was sought from his department. His work for the Service resulted in it getting widespread and very valuable publicity and aided materially in creating in the public mind a knowledge and an appreciation of what the Service is doing. His new work at Cornell will be upon somewhat similar lines. The University wishes to have a well organized bureau for general publicity and for furnishing the information for which its different branches are requested and Mr. Adams was asked by former assistant secretary of Agriculture Galloway, now head of the Agricultural Department at Cornell, to undertake the organization of such a bureau and to assume charge of it. While his many friends in the Service will regret losing him he takes with him their very best wishes for even greater success than he has already achieved.

What Chief Forester Henry S. Graves thinks of Mr. Adams' service is evident by his letter to Mr. Adams. He says:—

"It is a very great regret to me to learn that you are going to leave the Forest Service. I appreciate your position and under the circumstances could not expect you to do otherwise than you are doing. My regret is based entirely on the loss to us of your services. You

have created a place for yourself in our organization which will be very difficult to fill. Your contribution to the work has been a large one and it has been a contribution which I very deeply appreciate. Especially do I appreciate the loyal service that you have rendered to us and the way in which you have devoted your strength to the work, always with the single thought of the advancement of the interests of the Service. In leaving us you may be sure that you carry with you both our grateful appreciation of your past work and very best wishes for success in your new enterprise."

The Bureau of Insular Affairs of the War Department has received a cablegram from Manila, Philippine Islands, advising that the date for the opening of bids at the Bureau of Forestry in Manila for a concession covering the large forest known as the Tayabas-Camarines tract has been changed from November 14, 1914, to January 14, 1915.

A reforestation project is now under way in Muskegon County, Michigan, where 10,000 Norway and white pine will be planted on each of three tracts of land owned by John W. Wilson, Frank C. Whitney and F. S. Jacks, who in conjunction with Prof. C. A. Tyler, of the Michigan Agricultural College, have decided that it will pay them to reforest their unoccupied lands.

State Surveyor Samuel Higgins, of Roscommon, Michigan, has made pre-

liminary preparations for the reforestation of fifty-five 40-acre tracts of land located in Presque Isle County, Michigan. Sites for buildings necessary during the reforestation work have been selected and buildings are under way. Included will be a boarding house large enough for twenty men, the number to be employed in the work. Each forty will be planted with Norway, white and Russian pine as the chief varieties. Trees will be planted 5 feet apart and each tract will be protected from fire by a 16-foot clearance and in addition there will be a watch tower. The job represents the largest reforestation project yet undertaken in the State.

General education work in forestry is being carried on again this season by the New York State College of Forestry among High Schools, Granges, Men's and Women's Clubs and other organizations throughout the State of New York. This work is done with the idea that in spite of all the propagandist work that has been done in forestry in this country the man on the street is still quite ignorant of forest conditions and forest needs. In the winter of 1913-14 the College sent its foresters into 235 communities speaking to over 60,000 people. Already the present season the College has received applications from 142 organizations such as Granges, High Schools, Men's Clubs, Commercial Clubs, etc. At the present time from two to three counties are being made each week and foresters are talking to from 50 to 500 people at a lecture. During the week beginning November 16th, Professor R. P. Prichard gives illustrated addresses before four schools and granges in Erie County; Professor W. A. McDonald talks to three schools and a large Y. M. C. A. in Clinton county; Mr. Shirley W. Allen speaks before five High Schools in Westchester County.

In the national forests of District 4 of the Forest Service comprising parts of Utah, Wyoming, Nevada and Arizona, the 1914 forest fire season is practically ended.

The total of 399 fires this year is fifteen greater than in 1910, although the cost of extinguishing them was only one-third, and the total damage caused only $3\frac{1}{8}\%$ of that of the great fire year. In 1910, of a total of 384 fires, 237, or 62%, caused a damage of less than \$100, while 38%, or 147, each burned property worth \$100 or more. This season the number of fires whose damage was less than \$100 was $92\frac{1}{2}\%$, only 30 fires, or $7\frac{1}{2}\%$ of the total, doing a damage greater than \$100.

Seventy per cent of the fires occurred on the Idaho, Boise, Challis, Payette, Salmon, Targhee and Weiser Forests, lying in the main, in an east and west belt across central Idaho on the northern border of District 4, and 95% of the total expenditure for fires was incurred on these forests.

The timber destroyed was greatest on the Idaho, twenty million feet on 15,900 acres, and second greatest on the Salmon with 2,164,000 board feet, the acreage of timber land burned over on this forest being 10,818 acres.

The Supervisor of the Palisade speaks of the headway gained in coping with fires by use of automobiles, which in each case this year not only proved cheaper, counting the time of the men transported, than horse equipment, but of course contributed in a greater way in facilitating an earlier attack on the fire. This forest is surrounded by an unusual number of ranches and irrigated and dry farms, and the Supervisor states that he or District rangers were notified by from five to ten different persons of each fire, which shows the deep interest and splendid cooperation of the citizens generally toward the suppression of fires.

Upon the invitation of Hon. Frank L. Moore of Watertown, N. Y., President of the Empire State Forest Products Association, and also President of the American Paper and Pulp Association, the State College of Forestry at Syracuse developed for the annual meeting of the Empire State Forests Products Association at Utica on November 12th a very complete exhibit showing various kinds of timber preservation and the various materials used in preservation. This

exhibit attracted such favorable attention that the Association adopted a resolution commending the exhibit. Special exhibits of unusual interest were obtained from the U. S. Forest Products Laboratory at Madison, Wis., from the New York Central, the Erie, the Lackawanna and Pennsylvania railroads, the Barrett Manufacturing Company, the Eppinger & Russell Company, the Grasselli Chemical Company and the U. S. Wood Preserving Company and others. At the close of the meeting this exhibit was transferred to Syracuse where it will be displayed for a week in the rooms of the Technology Club of Syracuse.

Prof. R. R. Chaffee, of the Pennsylvania State College Department of Forestry, has undertaken a shingle experiment which he is desirous to have show two things, first, the durability of different kinds of shingle nails and in turn the increased life of the shingle, second, the chemical effects of the nail upon the shingle, and a thing of perhaps minor consideration, that of careful nailing, paying particular attention to the number of nails to the shingle and the total number of nails to each hundred square feet. He already has one roof, with a north and a south exposure, laid with western Red Cedar shingles, using five different kinds of nails, namely, pure copper, pure zinc, zinc-clad nails, the ordinary wire shingle nail, and the blue-cut nail. He is making arrangements to lay another roof with both Red Cedar and Cypress and introducing two other kinds of shingle nails, namely, copper-coated and lead-coated nails. He is making as thorough an investigation as possible of the nails from different companies, paying particular attention to zinc-coated nails and using in this connection both the Preece copper sulphate immersion test and the caustic soda test for determining thickness of coat and the thoroughness of application. Mr. J. R. Morehead, Secretary of the South-western Lumbermen's Association, has been of material assistance in furnishing material and information. He, for a long time, has been trying to find a

better shingle nail. It is extremely foolish to use a five-year nail in putting on a thirty-year shingle.

President Henry Landes, of the University of Washington, in his yearly report of the institution recommends the establishment of a complete forest products laboratory at the State University. This recommendation will be presented to the legislature at the session this winter. An estimate of \$50,000 is made of the cost of the establishment of such a laboratory.

W. W. Colton Forest Commissioner of West Newton, Mass., writes: "The principal forestry problem facing us here is the controlling of the Gypsy and Brown Tail Moth pest. We have an area of 18 square miles, all of which is fairly well settled, Newton being a wealthy residential section near Boston. We are confronted with a large number of small areas of woodland which are, unfortunately for us, made up mostly of oak growth, this oak growth being the choicest food plant of the gypsy and brown tail moths which naturally makes it much harder to care for. Most of these groves surround beautiful residences, making it particularly essential that they be properly cared for and preserved. Where it is possible, these groves are thinned and the production of more resistant species encouraged. The remainder are cared for by the usual methods of winter treatment of egg clusters and spring and summer spraying with arsenate of lead. The city owns and operates seven high-power sprayers, one small power sprayer and ten barrel sprayers. The past summer we used forty tons of arsenate of lead in our spraying operations. The flight of brown tail moths this summer was very light in Newton as a consequence of which we have very little work to be done on this pest this winter. The gypsy moth is about the same as usual, being scarce when thorough spraying was done and plentiful where the work was neglected. It is probable that by the end of December we will have expended \$39,000 for the suppression of these pests alone."

Fire protective work in Kentucky has been very greatly strengthened this fall. At the present time there are four district fire wardens, three in the Eastern part of the State and one in the Western part of the State. In addition to the federal patrolmen this fall, it has been found possible to appoint twelve State wardens so that the intensity of patrol is very greatly increased. Also in a limited number of counties in Western Kentucky wardens have been placed. Heretofore, all the fire protection has been confined to the Eastern section of the State. A fire map of Kentucky and a Manual of instructions to the wardens is in the process of preparation. An additional forest nursery has been established at Frankfort on a small scale this fall and the State nursery at Louisville has been very materially increased in size. During the summer just passed, an extensive water work system has been placed in the nursery at Louisville and a building has been erected for storing seed and handling trees for shipment. The nursery at Louisville promises to be considerable of a show place at no distant future date, since it is on the Western Parkway which is one of the links in the system of boulevards surrounding Louisville. The nursery grounds are adjacent to a similar area decided to the Federal Government for the purpose of a fish hatchery and every effort will be made to make both the State nursery and the federal fish hatchery attractive points of interest in Louisville.

The New York State Forestry Association organized at Syracuse in January, 1913, has made rapid growth during the two years of its existence and now has over 500 members from every section of the State and from many states outside of New York. It will hold its Third Annual Meeting in Convention Hall in Rochester in January, 1915, and it is expected to have leading foresters and naturalists from all parts of the country on its program. The evening meeting will be given up to informal addresses and moving pictures

showing woods operations, activities of forest schools and the life of the forester.

The Department of Agriculture has undertaken the investigation of a serious disease which is affecting the Rocky Mountain bighorn sheep and the mountain goats, and is reported as existing on the Lemhi National Forest in Idaho.

The forest officers think that it is the same disease that caused the mountain sheep to die in great numbers during 1882-3. The nature of the disease is not known, though it results fatally and sheep affected with it seem to have rough and mangy coats and are very much emaciated. Three bureaus of the department are engaged in the study—the biological survey, bureau of animal industry, and the forest service. A competent veterinarian has already gone to Idaho to start the work.

Very little actual loss from forest fires has occurred on the Michigan State Forests during the past season. With each year's added improvements along protective lines the facilities for handling fires promptly and effectively are increased and the chances of serious damage from this source are proportionately reduced. The forests are now better equipped than ever against the inroads of fires.

The improvements made this summer include the erection of steel lookout towers, and the construction of telephone lines, bridges, roads, and fire lines. Seven lookout towers are now in use on the various State Forests, and to afford communication between these towers and headquarters thirty-two miles of telephone lines were built. The system of fire lines on each of the Forests was considerably extended this year, a total of seventy-seven miles of new lines having been added. The total mileage of fire lines on all of the Forests is now something over two hundred miles.

This year Michigan was added to the list of those States receiving Federal aid in fire protection under the provisions of the Weeks Law. A sum not to exceed \$5000 to be used in defraying the salaries of the Federal patrolmen

was allotted to this State. This co-operative fund made possible the addition of nine men to the State's patrol force, four of the Federal patrolmen being stationed in the Upper Peninsula and five in the Lower Peninsula. Owing to delay in getting the work started, only a portion of the cooperative fund will be used.

The New York State College of Forestry at Syracuse University is the first College in the country to employ a full Professor to devote all his time to Forest Entomology and another to give all of his time to Forest Zoology. This is believed to be prophetic of the time when these subjects will be recognized as of large importance in Forestry and when they will receive the attention which has long been given to them in Europe. This action on the part of the College is in line with its efforts to make it possible for men to specialize through the four years of work in Forest Entomology and Zoology.

The Department of Forestry of Pennsylvania State College arranged an exhibition for the Forestry Section of the Agricultural School held November 13 and 14 which had two distinct features, Farm Forestry and Utilization. For the first, there was demonstrated the preparation of a farm nursery even to the germination, the growing seedlings, the transplants, and planting out. A miniature creosoting model suitable for farm purposes and growth figures for growing fence posts constituted the rest of the Farm Forestry Exhibit. For Utilization there was a fine exhibit of Hemlock, using the tape method of following out the products from the different parts of the tree. The school showed Utilization of practically everything that goes to the mill and including the waste in the woods. The Central Pennsylvania Lumber Company, the Oak Tanning Company, the Bayless Paper and Pulp Company, the Standard Wood Company and Wheeler and Dusenbury, all of Pennsylvania, and the Northern Hemlock and Hardwood Association through Mr. R. S. Kellogg,

helped to make this a success. Other features of the Exhibit were Hickory and Birch Utilization.

Ch. Guengerich, of Joplin, Missouri, writes: "I read with great interest the article on Roadside Tree law in your September number. Formerly our Board paid attention to trees along our roads by planting and trimming, but telephone and power lines destroyed so many trees that we gave up in despair. At the last session of the Legislature we tried for a law restricting the use of highway right of way by these pole lines to the north and east side of roads, since we have to have these lines, and shade on the south and west sides would be most desirable. We aim to try again this year for such a law."

The settlement and development of the west does not appear to have greatly reduced the number of animals which prey upon domestic live stock, and the loss from that source alone runs into the millions of dollars each year. Within the forests, however, the number of domestic animals killed has been appreciably reduced by the campaign against wild animals waged by the officers of the Forest Service. During the past eight years forest officers have killed over thirty-five thousand predatory animals, consisting of coyotes, wolves, bear, mountain lion, wild cats, lynx, etc.

The State Board of Trade of West Virginia at its last meeting passed a resolution favoring the passage of legislation for forest conservation and instructing the committee on Development and Protection of State Resources to draft such legislation as it may deem desirable to aid in securing the passage of suitable forestry legislation by the next Legislature.

One of two features of special interest in the course in Lumbering this year in the Department of Forestry at the Pennsylvania State College is the introduction of a current event day each week at which time each member of the

class discusses or presents the articles of interest in one of the lumber journals which has been assigned to him for an entire month. In this way he becomes quite intimately acquainted with the leading lumber journals of the world. The other feature is Pacific Logging Congress Day, held on November 19, at which time each man presented, with the aid of the stereopticon, one of the articles given at the last annual session of the Pacific Logging Congress.

The American Road Congress in its session at Atlanta, Ga., recently adopted, among other resolutions, the following: "That the Federal Government be urged to build highways across all Indian and Forest Reservations and all other Federalized areas where such

connecting links are essential parts of established through routes of travel."

The fifth annual meeting of the North Carolina Forestry Association will be held at Raleigh, N. C., on Wednesday, January 13, and a number of speakers have been assigned subjects of importance to the well-developed forest conservation movement in the State.

Forest students will be interested in learning that the members of the Forestry Club of the Forestry Department of the Iowa State College at Ames, Iowa, have adopted an official shirt, a dark grey stag shirt with the Forest Service emblem and the class numerals.

ARBORIST—FORESTER

By ALFRED GASKILL

THIS is a plea for the revival of an expressive old English term. As everybody knows a widespread interest in tree culture has produced a class of workers who give special attention to shade and ornamental trees. In many directions, especially through organized municipal activities, this field is broadening. Those men who as skilled foresters are engaged in it undoubtedly have a right to the title despite the character of their work, but the term city forester, or even forester as applied to one who cares for individual trees, is a misnomer. The terms tree warden, tree doctor, tree surgeon are equally unsatisfactory be-

cause they usually are connected with artisans rather than with professionals.

As a substitute for all these faulty terms the simple, descriptive, thoroughly established word *arborist* is suggested. It is found in all the standard dictionaries, has been used for years where tree culture, as distinguished from forest culture, is practiced, and satisfies an actual, present need.

It is scarcely necessary to add that arborists and arboriculture are as worthy and as important as forestry and silviculture. There is no question of inferior and superior. The proposition is made solely that we may have a means of indicating succinctly the line of work in which a specialist is particularly active.

Changes of Address

Members of the American Forestry Association are requested to send notification of any change in address so that the AMERICAN FORESTRY MAGAZINE and other mail will not be delayed in reaching them.

Such notices are desired before the 25th. of each month so that the address may be changed for the monthly mailing of the magazine.

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